



United States Department of Agriculture
Forest Service

Otter Vegetation Management Project

Environmental Assessment

Marienville Ranger District, Allegheny National Forest, Elk County, Pennsylvania

June 2019



Coarse woody debris and glossy buckthorn in the Otter project area, photo taken by Scott Ion, Archaeological Technician

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Introduction

The Forest Service is proposing vegetation management activities, including timber harvesting, reforestation activities, wildlife habitat improvements, non-native invasive plant species treatments, transportation activities, and recreation improvements within a 14,506-acre Otter project area on the Marienville Ranger District of the Allegheny National Forest. Proposed activities are intended to achieve specific objectives for forest structure and age class distribution, forest health, and wildlife habitat.

Overview of the Project Area

The Otter project area is located in Warrants 1568, 1778, 1783, 1830, 1858, 1863, 2038, 3232, 3251, 3252, 3254, 3265, 3278, 3283, 3284, 3656, 4537, 4846, 4847, 4848, 4849, 4856, and 4857, Highland, Jones, and Ridgway Townships, Elk County Pennsylvania. The project area is generally located northwest of Ridgway, Pennsylvania and encompasses approximately 14,506 acres.

Lands managed by the Allegheny National Forest are assigned a management area designation. This designation identified the suitable uses, desired conditions, and standards and guidelines for management of the Allegheny National Forest. The Otter project area includes National Forest System lands in Management Areas 2.2–Late Structural Linkages and 3.0–Even-aged Management (see Table 4).

Purpose and Need for the Proposal

Increasing early structural habitat

The Allegheny National Forest Land and Resource Management Plan (Forest Plan) identified desired vegetation structural distribution for the Forest for the year 2020. As shown in the Forest’s 2008–2013 monitoring report, there is a vegetation structural imbalance across the Forest (USDA-FS 2014, page 120). While mid and late structural stages are well-represented and meeting desired conditions, stands in early structural stages are falling far short of desired conditions. Only 3.8 percent of the Forest exists as early structural forest in 2015. This amount is less than half of the desired 2020 condition (USDA-FS 2007a, page 19, Errata). Currently, approximately 1 percent of the project area is in the zero to 20 age class (early structural habitat). An additional 1.5 percent of the project area was approved in previous decisions for regeneration harvests but have not been harvested yet.

The Forest Plan’s early structural vegetation objective will be met or exceeded once all of our proposed and recently approved projects are implemented. However, full implementation will take time due to a reliance on natural seedling establishment for regeneration. Since most of the forest does not already contain adequate advanced tree regeneration, we rely on a sequence of treatments to create growing conditions conducive for seedling establishment. Final harvest treatments can only occur once adequate tree regeneration is established. As a result, there can sometimes be a five, ten, or even twenty year lag between signing a project decision and completing all final harvests. As stands on the Allegheny National Forest continue to age and early structural vegetation constantly develops into mid-structural vegetation, it is important to continue creating early structural vegetation in order to sustain this component over time. This proposal would create an additional 1,449 acres (12 percent of the project area) of early structural habitat and would help maintain the overall age class distribution described in the Forest Plan desired condition.

Creating suitable conditions for the establishment and development of desired tree seedlings

A number of challenges exist for establishing desired tree seedlings on the Allegheny National Forest. These include dense shade cast by overstory, midstory, and interfering understory vegetation, preferential browsing by deer, periodic seed crops, and variable seed viability, and in some cases, the decline of potential seed trees. Desired tree seedlings do not develop in sufficient quantities on the Allegheny National Forest without intensive forest management. Interfering understory vegetation frequently outcompetes tree seedlings as a result of decades of selective deer browsing (Horsley, Stout, and deCalesta 2003). Management actions create suitable conditions for the establishment and development of desired tree seedlings, in order to maintain important ecological structure, function, and processes.

Addressing the decline of American beech, black cherry, white ash, and eastern hemlock

This project is needed to address present and potential future decline of American beech, black cherry, white ash, and eastern hemlock, due to non-native and native insects and diseases and other factors discussed below. If no action is taken, forest stocking levels may be reduced and could potentially result in areas with few seed trees, with forest understories dominated by interfering vegetation, including thickets of beech, striped maple, ferns, and glossy buckthorn. In some areas, few to no seed trees would remain. Stands with reduced stocking due to insects and diseases are more vulnerable to damage from windthrow, storms, and other general injury to tree crowns.

Vegetation management can affect forest health through a variety of overstory and understory treatments. Declining, mature, or poorly stocked stands can be regenerated to vigorous well-stocked young forest stands through a combination of timber harvest and reforestation treatments. Managing and regenerating declining stands now would promote natural regeneration of a diversity of desired trees. It would sustain healthy, well-stocked forested stands over the long-term. This project is designed to address forest health concerns by regenerating stands before natural regeneration opportunities are further reduced. Deferring action of these stands would likely increase the difficulty of successfully restocking them with diverse tree seedlings that would result in a more resilient future forest.

Providing a diversity of vegetation structural stages, age classes, and forest types

Forest Plan desired conditions include providing a diversity of vegetative structural stages, age classes, and forest types across the landscape within the context of multiple use management. The purpose of this project is to sustain a desirable mix of tree species to ensure a healthy, diverse, and resilient forest. The dominant forest types on the Allegheny National Forest are upland and Allegheny hardwoods, primarily consisting of black cherry, red maple, black birch, and tulip poplar, and white ash. American beech, eastern hemlock, yellow birch, and cucumbertree are common associates.

The uniformity of second growth forest across the Allegheny National Forest increases vulnerability to damage from repeated natural stresses and exotic insects and diseases. Beech bark disease¹ is an introduced insect-fungus complex which has resulted in substantial American beech mortality across the Forest and in the project area. The fungus complex, introduced from Europe, results in the death of mature American beech trees. Once mortality of mature beech trees occurs, a dense thicket of beech suckers, or beech brush, is produced. As these suckers are genetically identical to the mature beech that died from the disease complex, they are also susceptible to the disease and will succumb to the disease complex in the next couple of decades. The dense regeneration of beech within the understory of infested

¹ For information on beech bark disease visit <http://na.fs.fed.us/fhp/bbd/>

stands prevents the establishment of other tree seedlings and creates a virtual monoculture that lacks the benefits of natural forest biodiversity (Forrester and others. 2003; Hane 2003; Latty and others 2003).

In addition to mortality of beech, the health and abundance of white ash and hemlock is a growing concern on the Forest. Emerald ash borer² is responsible for the rapid mortality of millions of ash trees across their range in the eastern United States, and was detected on the Allegheny National Forest in 2013. The project area contains very few ash trees and most of these trees are infested with emerald ash borer and have perished. Hemlock woolly adelgid³ was also confirmed on the Forest in 2013. It is much slower spreading than emerald ash borer, but is expected to similarly result in high mortality levels to eastern hemlock beginning in the coming decade.

Black cherry crown health has been declining in many areas on the Allegheny National Forest. The reasons for this decline are not entirely clear, but it is thought that decline is linked to a number of interacting factors including insect defoliations, other canopy disturbances such as wind events and loss of American beech trees to beech bark disease, changing soil nutrient status, and potentially changing climate and weather patterns. Recent monitoring conducted on the Allegheny National Forest identified increases in black cherry decline and observed mortality on the Allegheny national Forest and on the Allegheny Plateau (Long and others, personal communication 2015 unpublished; PA Bureau of Forestry 2015 unpublished). Specifically, the proportion of stand dead black cherry stems on 97 intensive forest health monitoring plots containing black cherry on the Allegheny National Forest has increased from less than 10 percent in the 1998–2001 measurement cycle to more than 22 percent in the 2014–2015 measurement cycle. Similarly, continuous forest inventory data collected on the Pennsylvania High Plateau (Allegheny National Forest region) noted an increase from around 3 percent dead black cherry stems in the 1997–2000 measurement cycle to more than 30 percent in the 2009–2013 measurement cycle.

Cherry scallop shell moth is a defoliator of black cherry, and occasionally other native cherries. The moth is a native insect to Pennsylvania and the eastern United States. The moth larvae fasten margins of leaves together and form an elongated nest, within which they feed on the upper tissues of the leaves. Once feeding is complete, the larvae will move on to construct more feeding nests. Damage to black cherry trees range from a loss of radial growth, partial crown mortality to total tree mortality, depending upon the severity (percentage of the crown) of the defoliation and the duration (how many years) of defoliation. Currently the Allegheny National Forest is in the fifth year of a cherry scallop shell moth outbreak and each year the outbreak area has increased in size. The Forest Service is monitoring cherry scallop shell moth defoliation and associated effects on overall black cherry crown health.

Non-native invasive glossy buckthorn (*Frangula alnus*) has grown from known small populations in 1990s to infestations over tens of thousands of acres in 2018. The expanding population that may impact hundreds of thousands of acres in the foreseeable future if left unchecked. These thickets can impede hunters, hikers, and wildlife moving through the forest, as well as exclude other shrubs, trees, and native herbaceous plants from establishing or remaining on site. Wherever they dominate the shrub layer, they can grow so thickly that they prevent the establishment of native species and reduce any opportunity for plant diversity. Dense thickets of buckthorn also increase shade (which reduces tree seedling growth and survival) and increase competition for water and nutrients. In all cases, the presence of the prolific buckthorn retards natural patterns of genetic variation in native species. It also threatens to impede the range of silvicultural and reforestation practices available to the Allegheny National Forest to promote a diversity of tree seedling of good quality, form, and health and maintain high quality hardwood

² For information on emerald ash borer visit <http://na.fs.fed.us/fhp/eab/>

³ For information on hemlock woolly adelgid visit <http://www.na.fs.fed.us/fhp/hwa/>

sawtimber. Interference from non-native invasive plants is a threat to forest health and native plant communities. Monitoring and controlling the spread of invasive plant species is an important component of providing a healthy, sustainable forest ecosystem.

Potential old growth

As per the Forest Plan standard (page 115) for Management Area 3.0, a set of currently identified and mapped potential old growth areas is maintained for Management Area 3.0–Even-aged Management and these areas may be reevaluated and adjusted during project planning. There are seven stands in Management Area 3.0 within the Otter project area that were previously designated as potential old growth. Three of these stands 871049, 871073, and 885024 are being proposed for regeneration harvests due to forest health concerns.

For all of three stands, glossy buckthorn is in the understory of adjacent or nearby stands and presents an additional impediment to stand diversity and health when the beech brush succumbs to beech bark disease. And for all three stands, the need for salvage and regeneration treatments would make it unlikely that they would retain any potential for old growth characteristics.

Enhancing wildlife habitat

Inventory data and field surveys indicate a variety of habitat conditions in differing amounts occur throughout the project area. Multiple vegetative age classes occur providing cover and structure for a variety of wildlife species. Predominately maturing forest over-story trees exist, but varied vegetative conditions occur in the forest understory. Small tree and shrub conditions occur in the understory, but are also present in riparian areas and herbaceous openings throughout the project area. These shrubs include mainly witch hazel, Juneberry, and muscle-wood. Vegetative wetlands and riparian areas contain varied amounts of those species as well as species associated with wetland conditions. Conifer cover is mainly in the form of hemlock and occupies the riparian areas as well as drier hilltop site conditions. Plantations of red pine, tamarack, and occasional white pine exist in some locations. Herbaceous openings, both constructed from historic management and those occurring in wetland and riparian environments exist. Snags, den trees, and coarse wood occur in some of the area providing structure and den sites for wildlife species. Non-native invasive plant species, mainly glossy buckthorn are widespread and influence the area's condition. There is a need to enhance or create wildlife habitat for a variety of wildlife species where the conditions exists or are absent.

Reducing interference from non-native invasive plant species

The project area is undergoing a variety of changing habitat conditions. Field surveys indicate that forest health, which includes all vegetation, is being affected by a variety of non-native invasive insects, disease, and mortality, natural disturbances such as wind and storm events, and selective deer browsing in some species and some places. Non-native invasive plants are quickly adapting to changing conditions and establishing themselves in areas where native vegetation had predominately existed. Both climatic and seasonal changes will occur in both the short term and long term that will also affect wildlife habitat. Although the project area contains a variety of non-native invasive plants, glossy buckthorn is the primary threat to wildlife habitat. Because of its adaptability and proliferation abilities in a variety of growing conditions, it is present in all forms of habitat and dominates site conditions, crowding out and influencing native vegetation. There is a need to reduce non-native plant species to ensure native plant diversity and health.

Improving stream conditions

Stream habitat monitoring found that many streams in the project area lack habitat diversity that would contribute to improved habitat for aquatic animals and enhanced recreational experiences for anglers. Pools and slow water habitat are present but lack cover and pools are generally shallow. Also, large wood

monitoring on several streams shows streams lack sufficient large wood to create quality pools, slow flood flows, or store sediment and organic debris. Many streams are also lacking adequate vegetation to provide shading and to provide an adequate supply of large wood in the future.

Improving soil and water quality

Waterways in the Big Mill Creek and Bear Creek watersheds are susceptible to acid precipitation due to their location, shallow soils and parent geology with low buffering capacity (USDA-FS-2007b, page 3-27). There are 5.9 miles of streams in Otter project area that fail to meet Commonwealth water quality standards and are listed as impaired. These streams' listings note "do not attain protected water uses" due to low pH from "Atmospheric Deposition". The waters include Bloody Run and Rocky Run within the Big Mill Creek and Bear Creek Watersheds. As acid precipitation contacts with watershed soils it releases and mobilizes dissolved aluminum from the soil. The transport of dissolved phases of aluminum from watershed soils and through stream systems is toxic to fish and other aquatic life at low concentrations. There is a need to apply lime throughout Big Mill Creek and Bear Creek watersheds where it would be beneficial to soil and water resources, and in the long-term benefiting the aquatic resources. The lime would help neutralize the acidity with in soil pore water and increase pH and alkalinity of soil stormwater runoff, surficial groundwater, and waterways.

There are numerous dispersed camping sites within the project area. Many of these sites are in riparian areas. Soils and vegetation in riparian areas are very sensitive and loss of vegetation and compaction of the soil can occur rapidly. There is a need to close some dispersed campsites and improving others to mitigate the impacts to soils and water quality and to create a more sustainable dispersed camping experience.

Illegal ATV use occurs in several places across the project area, usually on powerlines and other utility corridors. Illegal riding causes soil compaction, soil erosion, and loss of vegetation. There is a need to block illegal ATV access points within the project area to reduce or eliminate impacts to soils and water quality.

Public Involvement and Tribal Consultation

Public involvement for the Otter project is summarized in the attached Appendix A–Scoping Comments Summary. The Forest Service is also consulting with the Pennsylvania Historical and Museum Commission, the State Historic Preservation Office, and Tribal Historic Preservation Offices.

Proposed Action and Alternatives

Proposed Action

The proposed activities for proposed action are summarized in Table 1 and displayed on the attached maps. More site-specific information is on the proposed action and list of stands in each category can be found in Appendix B–Site Specific Proposals. Proposed timber harvest activities would include even-aged and uneven-aged management on 1,587 acres, about 13.2 percent of National Forest System lands within the project area. Any unfinished activities approved in the previous decisions would also proceed as planned (see Table 3).

Errata and clarifications to the Scoping Proposal and Proposed Action

- Stand 886020 (46 acres in size) was inadvertently left off of Map 6 and was not included in the table of temporary blocks in the scoping package as a temporary opening greater than 40 acres in size. This stand has been added to Map 6 and to the appropriate tables in the environmental assessment.
- Two stands (897016 and 897038) (together 54 acres in size) were inadvertently left off of Map 6 and were not included in the table of temporary blocks in the scoping package as a temporary opening greater than 40 acres in size. These stands have been added to Map 6 and to the appropriate tables in the environmental assessment.
- Prior to scoping, stand 871064 was split into two stands (871064 and 871099) as shown on Map 2 in the scoping package. However, this was not carried over to Map 6 in the scoping package, which shows stand 871064 prior to it being split into two stands. This has been corrected on Map 6 in the environmental assessment.
- Temporary opening block 237F touches temporary opening block 4 (171 acres) from the Pine Bear Supplemental Environmental Assessment project. Temporary opening block 4 from the Pine Bear Supplemental Environmental Assessment has been added to Map 6 and appropriate tables in the environmental assessment.
- Two additional temporary opening blocks called 237 South (89 acres) and 170 North (71 acres) were inadvertently left off of Map 6 and not included in the table of temporary blocks in the scoping package. Block 237 South includes a stand from the Pine Bear Supplemental Environmental Assessment project. Temporary opening blocks 237 South and 170 North have been added to Map 6 and appropriate tables in the environmental assessment.

With these corrections, there will potentially be 14 blocks of temporary openings over 40 acres in size within the Otter project area totaling 1,795 acres from the proposed timber harvests and previously approved timber harvests.

Changes to the Proposed Action since Scoping

- Additional fieldwork has resulted in changes to the recreations proposals. The changes are reflected in Table 1 below and in Table B-6 in Appendix B—Site Specific Proposals. Nineteen (19) dispersed campsites are proposed for improvement now instead of 21, and 10 dispersed campsites are proposed for closure now instead of eight.
- Decommissioning of non-system road NS030195 (0.7 miles), off the end of forest road 237B, has been added to the proposed action (see Map 5).
- Proposed decommissioning of two segments of forest road 135C, which are needed to access oil and gas wells, have been dropped from the proposed action (see Map 5).

Table 1–Summary of proposed activities for Proposed Action

Even-aged Vegetation Management (without forest health concerns) (acres)	
Shelterwood seed cut (1 st entry)/Shelterwood removal (2 nd entry)	437
Shelterwood removal	7
Delayed overstory removal	52
Even-aged Vegetation Management (with forest health concerns) (acres)	
Shelterwood seed cut (1 st entry)/Shelterwood removal (2 nd entry)	697
Shelterwood removal	45
Overstory removal	24
Delayed overstory removal	187
Uneven-aged Vegetation Management (acres)	
Intermediate thinning to accelerate mature forest conditions (AMFC)	70
Single tree selection (1 st entry)/group selection (2 nd entry)	68
Understory Vegetation Treatments (acres)	
Herbicide–reforestation	1585
Site preparation	1585
Herbicide–reforestation (follow up treatment if needed)	1515
Site preparation (follow up treatment if needed)	1515
Fence construction (optional)	1487
Tree shelter installation	482
Tree planting for species diversity	482
Release for species diversity	1543
Non-native invasive plant species treatments (herbicide and manual)	67
Wildlife Management	
Opening rehabilitation (acres)	22
Prescribed burning (acres)	16
Planting (acres)	71
Fencing (acres)	67
Structure installation (number)	76
Brush pile creation (number)	35
Aquatic Habitat Treatments	
Large wood introductions (place in streams - up to 170 trees/mile) (miles)	30.2
Riparian Planting (acres)	24
Soil and Water Quality Improvement (acres)	
Lime Application of Select Vegetation Management Stands	272
Recreation Improvements (number)	
Improve dispersed camping sites	19
Convert dispersed camping site to parking area	1
Close dispersed camping sites	10
Block illegal ATV use	4 sites

Travel Management (miles)	
Road construction – new corridor	1.2
Road construction – existing corridor	1.0
Road reconstruction – realignment	1.7
Road maintenance	35
High quality (limestone) road surfacing (within 300 feet of a stream)	14.3
Road decommissioning	11.0
Road management changes from open to restricted (Forest roads 135A and 237B) and from closed to restricted (Forest road 385)	4.6
Install new gates (number)	8

Note: Additional non-native invasive plant species treatments approved in the Marienville Buckthorn Treatment decision will also be implemented within the project area.

In some areas, proposed regeneration harvests will create temporary openings that will exceed 40 acres in size. Our analysis will examine the effects to vegetation and other resources from the proposed temporary openings greater than 40 acres. The resulting temporary openings larger than 40 acres would ensure adequate stocking levels in stands affected by declining health of black cherry, beech bark disease complex, and other forest health concerns. As with all proposed activities, Forest Plan standards and guidelines will be followed for temporary openings created by the application of even-aged silviculture (USDA-FS 2007a, page 68). The proposal to create these large openings will receive Regional Forester review and concurrence.

The acres listed in Table 2 represent the maximum opening size possible if all stands in the block were to be treated at the same time. However, actual opening sizes would likely be smaller than the amounts listed because (1) proposed timber harvest treatments would be staggered over time so that less than 25 percent of any small watershed area would be in the 0 to 5-year age class at any given time; (2) applying design criteria, such as stream buffers and other resources buffers, that break up potential contiguous large temporary openings, and (3) taking other actions to reduce potential temporary opening size, such as reducing or dropping treatment areas due to operability or other resource concerns.

The following list shows the combination of stands that when treated, would result in temporary openings (areas or blocks) over 40 acres in size (please see Map 6 for their locations).

Table 2–Temporary opening blocks over 40 acres in size

Block	Stands	Total Acres
135A	897016, 897038	54
135C North	886008, 886016, 886017, 886018, 886025, 886037, 8860055, 8860056, 886057, 886058, 886068	222
135C South	8860026, 8860027	54
170	865025 and 865074	48
170 North	865018, 865033, 865072, 865078	71
237 North	865012, 865066, 865071, (865067)	80
237 South	882062, 882095, (882091) [882019], [882021], [882104]	89
237B	886020	46
237F	871028, 871033, 871049, 871064, 871069, 871071, 871073, (871083), (871085), (871101), [871018], [871024], [87104], [871051], [871057], [871066], [871068], [872003], [872049]	454
297	871108, [871008], [871045], 871046], [871063] [871092], [871096]	93
385 South	870012, 870013, 870014, 870015, 870016, 870017, 870043, 870046, 870049	260
385A	870003, 870030, 870033, 870082	109
385B	870005, 870038, 870080	47
385E	866002, 866003, 866007, 866008, 866044, (866045), [866006],	168

Note: Stands without parentheses or brackets are proposed for regeneration harvest in the Otter project. Stands in () are stands that were approved for regeneration harvest in other projects and have recently been cut. Stands in [] are stands that with were approved for regeneration harvest in other projects but have not been cut yet.

No Action Alternative

Activities approved in previous NEPA decisions would occur. Within the project area, management activities have previously been approved in the following decision documents: East Side Final Environmental Impact Statement (2000), FY07 Regeneration Environmental Assessment (2008), Apple Tree Prune and Release Categorical Exclusion (2009), Aspen Regeneration Categorical Exclusion (2013), and Marienville Buckthorn Treatment (2016). Table 3 describes other activities that have been approved in previous NEPA decisions that have not been implemented yet within the project area.

Table 3–Management activities approved in previous NEPA decisions

Previously approved activities	
Shelterwood removal cuts (acres)	180
Herbicide for reforestation (acres)	4
Tree planting for species diversity (acres)	11
Release for species diversity (acres)	81
Planting for wildlife (acres)	4
Opening enhancement (acres)	5
Aspen regeneration (acres)	4.4
Apple tree pruning and release (acres)	80
Glossy buckthorn treatment (acres)	500 to 1000 annually ¹

¹ Dependent of funding and available resources.

Alternatives Considered but Eliminated from Detailed Study

The following alternatives were considered but were eliminated from detailed study as explained below.

An alternative that does not include the use of the herbicide glyphosate – This alternative was considered but eliminated from detailed study because it does not meet the purpose and need, which includes improving the spatial arrangement of age classes in Management Area 3.0, restoring and maintaining forest health throughout the project area, limiting the further introduction and spread of non-native invasive plant species, and enhancing wildlife habitat and improving habitat diversity by reducing non-native invasive plant species and establishing desired vegetation. The proposed action would enhance the resiliency of the forest by providing diverse vegetation patterns across the landscape to represent well-distributed habitats, a range of forest age classes and vegetative stages, a variety of healthy functioning vegetation layers, moderate-to-well stocked forest cover, and the variety of vegetation species and forest types necessary to achieve multiple resource objectives and sustain ecosystem health (USDA-FS 2007a, page 14). Not using herbicides would limit our ability to treat non-native invasive plants within the project area as herbicides are the only effective means of treating many non-native invasive plants.

An alternative that does not involve timber harvesting – This alternative was considered but eliminated from detailed study because it does not meet the purpose and need, which includes improving the spatial arrangement of age classes in Management Area 3.0, restoring and maintaining forest health throughout the project area, limiting the further introduction and spread of non-native invasive plant species, and enhancing wildlife habitat and improving habitat diversity by reducing non-native invasive plant species and establishing desired vegetation. The proposed action would enhance the resiliency of the forest by providing diverse vegetation patterns across the landscape to represent well-distributed habitats, a range of forest age classes and vegetative stages, a variety of healthy functioning vegetation layers, moderate-to-well stocked forest cover, and the variety of vegetation species and forest types necessary to achieve multiple resource objectives and sustain ecosystem health (USDA-FS 2007a, page 14). The no action alternative is responsive to this concern.

An alternative that retains or enlarges the two unroaded areas within the Otter project area – This alternative was considered but eliminated from detailed study because the unroaded areas identified during 2003 Forest-wide Roads Transportation Analysis Process were considered during forest plan revision, and whether to maintain them as unroaded or more actively manage them was determined through the assignment of management areas. As a result, the role these unroaded area is expected to play from a

larger, landscape-level perspective has been decided. Also, proposed road decommissioning in the proposed action would result in an increase in unroaded area acres from 2,316 acres to 2,510 acres within the project area even with the proposed road construction and reconstruction. The no action alternative is also responsive to this concern.

An alternative that does not create any temporary openings over 40 acres in size – The interdisciplinary team and responsible official considered an alternative that would restrict temporary opening size to 40 acres or less, and then revisit the untreated areas in the future, after adjacent treated stands are restocked. This approach, however, is not viable since additional tree mortality could occur well before adjacent areas are restocked. It may take 10 to 15 years for treated stands to reach 15 feet tall, when they are no longer considered temporary openings. This gap between seed tree mortality and adjacent stand restocking, when combined with overstory decline and mortality from other factors, would substantially jeopardize our ability to naturally regenerate stands. Active management in the future, moreover, would most likely become challenging if mortality reduces the economic value of timber to the point where sales are no longer commercially viable. This possible lack of commercially viable timber sales could hinder our efforts to work toward the desired conditions for the project area.

The interdisciplinary team and responsible official also considered the possibility of salvaging dead and dying trees in these stands without any reforestation activities to promote diverse, desirable tree seedling establishment. This approach, however, is not prudent and would not achieve the project purpose and need since stand health would continue to decline. Without stand regeneration and reforestation activities that would result in these larger openings, the number of stands with stocking levels of desirable tree species and understory diversity would continue to decline, and our ability to naturally regenerate a younger cohort of diverse, hardwood species would be jeopardized. The result would be a two-aged community consisting of a poorly stocked overstory and an understory dominated by undesirable vegetation such as disease-prone beech root suckers. Although this approach may work in some instances, the chances of it being successful are unlikely and would vary substantially depending on site conditions.

Environmental Consequences of the Proposed Action and Alternatives

Project Area Description of the Affected Environment

The Otter project area (see Map 1) consists of approximately 12,052 acres of National Forest System lands and 2,454 acres of private land. This is approximately 2.3 percent of National Forest System lands within the Allegheny National Forest proclamation boundary. The project area lies within the Big Mill Creek (a municipal watershed [Ridgway, Pennsylvania]), Little Mill Creek, and Bear Creek watersheds. The project area includes the following streams: Big Mill Creek, Bloody Run, Bunts Run, Otter Run, Pine Run, Red Mill Run, Rocky Run, and Spencer Run. Management areas for National Forest System lands within the project area is described in Table 4.

Table 4—Management Areas within project area

Management Area	Acres
2.2 – Late Structural Linkages	5130
3.0 – Even-aged Management	6922
Private lands	2455
Total	14506

The Otter project area contains approximately 85 miles of roads – 38 miles of National Forest System roads, 7 miles of state and township roads, and 40 miles of non-system roads. The National Forest System roads are managed for public motor vehicle use as follows: 20 miles are open year round, 5 miles are seasonally restricted, and 13 miles are closed year around. There are no mixed-use roads (roads being used as both roads and trails) in the project area. There are also no hiking, ATV, or snowmobile trails within the project area.

The project area does not include any federally designated wild and scenic rivers (closest one, the Clarion Wild and Scenic River, lies about 2.8 miles to the south), designated wilderness areas, (closest one, Hickory Creek Wilderness Area, lies about 23.3 miles to the northwest), or wilderness study areas (closest one, Minister Valley Wilderness Study Area, lies about 18.3 miles to the northwest).

Forested stands consist primarily of even-aged, second-growth stands of trees that grew after timber harvesting occurred in the late 19th and early 20th centuries. Table 5 provides a summary of acres (National Forest System lands only) in different habitat structural classes within the project area. Early structural habitat (zero to 20 years old) is declining throughout the region (USDA-FS 2007a, page 8) and the project area.

Table 5—Age classes and habitat conditions within the project area

Habitat and landscape conditions (National Forest System lands)		
Forest communities	Acres	Percent
Deciduous Hardwood	10,612	88
Conifer	684	6
Non-forest	765	6
Forested age classes	Acres	Percent
0 to 20 years	195	2
21 to 50 years	1,422	12
51 to 80 years	2,162	18
81 to 110 years	5,803	48
111+ years	1,705	14
Stream/riparian/wetlands (National Forest System lands and private lands within the project area)		
National Wetland Inventory Wetlands ¹	326 acres	97 percent on National Forest System lands; 3 percent on private lands
Streams ²	40.5 miles	85 percent on National Forest System lands; 15 percent on private lands
Riparian stream/floodplain (100 feet on each side of streams) ³	1,055 acres	86 percent on National Forest System lands; 14 percent on private lands

¹ Includes federal and non-federal ownership

² Includes streams across federal and non-federal ownership

³ Stream and riparian habitat include all lands within 100 feet of perennial or intermittent streams.

All of the subsurface mineral estates within the project area are privately owned. Currently, there are 60 (active or dormant) private shallow oil and gas wells within the project area. This is about one well for every 242 acres within the project area. Shallow oil and gas wells have associated tank batteries, pipelines, additional equipment, power lines, and access roads. There are no deep gas wells within the project boundary. The Forest Service is not proposing any oil and gas development as part of this project.

Indicator Measures for Resource Analysis

To analyze and disclose the environmental, social, and economic effects of the alternatives considered in detail for this project, the following indicator measures by resource area were identified by the interdisciplinary team and the responsible official.

Table 6–Indicator measures for environmental analysis

Resource Analysis	Indicator Measure
Vegetation	Indicator Measure 1: Effects of the alternatives on forest health and diversity of age and structural classes.
Wildlife and Sensitive Plants	Indicator Measure 2: Effects of the alternatives on Federal threatened or endangered species or designated critical habitat.
	Indicator Measure 3: Effects of the alternatives on Regional Forester Listed Sensitive Species and species identified as having viability concerns listed in the Forest Plan.
Non-native Invasive Plants	Indicator Measure 4: Effects of the alternatives that may cause or promote the introduction or spread of non-native invasive plant species.
Soils and Hydrology	Indicator Measure 5: Effects of the alternatives that may result in permanent conversion of Natural Resource Conservation Service designated prime farmland to other uses.
	Indicator Measure 6: Effects of the alternatives on soils designated by the Forest Service as sensitive (groups 2 and 3).
	Indicator Measure 7: Effects of the alternatives on water quality and water quantity.
Air Quality	Indicator Measure 8: Effects of proposed activities on the attainment of national ambient air quality standards.
Heritage	Indicator Measure 9: Effects of the alternatives on cultural resources.
Recreation Opportunities and Forest Settings	Indicator Measure 10: Effects to the recreation opportunity spectrum, landscape character and scenic integrity levels, and recreation activities and use patterns.
Human Health and Safety	Indicator Measure 11: Risks to public health or safety.

Cumulative Effects Analysis Areas

Council on Environmental Quality (CEQ) regulations define cumulative effects as “... the impact on the environment which results from incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions (40 CFR 1508.7). Cumulative effects analyses examine the effects of other activities on National Forest System and private lands that may occur within a specific time and within a specific area, which may vary for each resource. Factors used to determine the time span and area for analysis of cumulative effects for each resource are described in Table 6.

1. **Past activities:** In order to understand the contribution of past activities to cumulative effects, this analysis relies on current environmental conditions as a proxy for the impacts of past activities for most resources. This is based on existing conditions and reflects the aggregate of prior human actions and natural events that have affected the environment of the cumulative effects analysis area, all of which contribute to cumulative effects.

2. **Present activities:** Activities currently undergoing implementation on National Forest System lands as well as activities on private lands within the cumulative effects analysis areas.
3. **Reasonably foreseeable future activities:** Known activities on National Forest System lands as well as on private lands within the cumulative effects boundaries that would be implemented within the next 20 years. This includes previously approved Forest Service activities, private activities that occur on National Forest System lands, and activities on private lands.

Table 7–Cumulative effects analysis factors

Resource	Time Period	Spatial Boundary
Vegetation and Forest Health	<p>Time frame: 2019–2039</p> <p>Rationale: This span of time accounts for the completion of harvesting activities and 5 years post-harvest when regeneration is expected to be established (within 20 years).</p>	<p>Boundary: Forested stands within the project area</p> <p>Rationale: Effects to forested stands are contained within treated stands, and do not influence or alter vegetation outside of the treatment boundaries, either directly or indirectly; therefore, no additive effect can be described or measured outside of treatment areas.</p>
Wildlife	<p>Time frame: 2019–2039</p> <p>Rationale: This span of time accounts for the completion of harvesting activities and 5 years post-harvest when regeneration is expected to be established (within 20 years).</p>	<p>Boundary: The project area (14,506 acres) is the cumulative effects analysis boundary for threatened and endangered species, Regional Forester's Sensitive Species, species with viability concerns, and game species.</p> <p>Rationale: Within this area, vegetation cover types, forest structure, wildlife habitats, soil types, and developments from federal and non-federal entities are similar. This area shares a landscape with similar drainage patterns, terrain, aspect and exposures as well as natural disturbances, such as insect pests, diseases, non-native invasive plant species, and wind and ice storms. Portions of the Big Mill Creek and Bear Creek are included within this area as well as Little Mill Creek, which drains primarily private land in the project area.</p>
Plants	<p>Time frame: 2019–2039</p> <p>Rationale: The proposed activities should be completed within 20 years and early structural habitat established.</p>	<p>Boundary: The project area</p> <p>Rationale: The cumulative effects boundary for plants is the project area boundary. Project effects are expected to be localized due to low motility of plants and this boundary accounts for the overlap of time and space for cumulative effects.</p> <p>Measuring the spread of non-native invasive plants beyond this boundary as it relates to the proposed activities is not desirable due to the confounding effects of other dispersal methods, such as wind, water, and animals.</p>
Soils	Time frame: 2019–2039	Boundary: The project area

Resource	Time Period	Spatial Boundary
	<p>Rationale: Twenty (20 years) is the time frame to analyze potential cumulative effects. Where ground cover is removed, reestablishment of vegetation can be expected to occur in less than 5 years. This timeframe allows for completion of proposed, remaining approved, and foreseeable future activities.</p>	<p>Rationale: The spatial boundary used to address direct and indirect effects includes all the National Forest System lands within the project area. The spatial boundary used to address cumulative effects is the project area, including private lands within the project area, because it encloses all the proposed treatment areas in the project.</p>
Hydrology	<p>Time frame: 2019–2039 Rationale: A timeframe of 20 years is used for the water quality and quantity cumulative effects. Based on research the effects of timber harvesting on streams is expected to disappear 5 years after the final harvest occurs. Local monitoring has shown that erosion potential and bare soils decrease after the first year when revegetation occurs on skid trails. The effects of roads vary over time depending on road maintenance but are expected to improve if maintenance occurs.</p>	<p>Boundary: The spatial boundary for cumulative effects analysis is the subwatersheds within the project boundary. Rationale: The project boundary overlaps three subwatersheds including Bear Creek, Big Mill Creek, and Little Mill Creek-Clarion River. This project boundary overlaps the middle portion of these three subwatersheds so it would dilute the effects too much if the entire subwatershed was analyzed as the cumulative effects boundary. The activities are analyzed in small watersheds within the subwatersheds, which are within the Clarion River basin.</p>
Air quality	<p>Time frame: 2019–2030 Rationale: The time period provides an overall view of the incremental impact of proposed activities and private oil and gas development activities in combination with past, present, and reasonably foreseeable future activities. Activities contributing to emissions beyond 2030 are too uncertain to be rigorously analyzed.</p>	<p>Boundary: The Otter project area as a percentage of the four-county area. Attainment of National Ambient Air Quality Standards was evaluated at the local and regional levels. Rationale: The closest air quality monitor for ozone is in Kane, and for sulfur dioxide is in Warren, while other monitors are located in Erie and Pittsburgh. Future emission estimates were modeled at the county scale. Emission models have been developed to estimate emissions through 2028.</p>
Heritage Resources	<p>Time frame: 2019–2039 Rationale: This timeframe allows for completion of proposed, remaining approved, and foreseeable future activities.</p>	<p>Boundary: The area of potential effects comprises forested stands with proposed vegetation treatments, wildlife enhancements, access roads, skid trails, and non-native invasive plants treatments. Rationale: Direct effects to heritage resources would be avoided; the area of potential effect accounts for indirect and cumulative effects of the proposed activities.</p>
Recreation Opportunities and Forest Settings	<p>Time frame: 2019–2039 Rationale: The time period considers effects from past activities (already approved</p>	<p>Boundary: The project boundary Rationale: The cumulative effects analysis area for recreation is the same as the project area because recreation patterns are</p>

Resource	Time Period	Spatial Boundary
	projects not completed yet) and the anticipated completion of the activities proposed through this project.	localized. The cumulative effects analysis area for scenery is the same as the project area with the exception of the area to the west of the project area covering forest roads 237 and 339. These roads would be used as haul routes that take timber from harvest areas inside the project area and haul timber outside the project boundary through the forest to major highways to reach its final destination.
Human Health and Safety	Time frame: 2019–2039 Rationale: This timeframe allows for completion of proposed, remaining approved, and reasonably foreseeable future activities.	Boundary: The project area Rationale: The potential effects from herbicide application and prescribed fire are localized within the project area.

Vegetation

Analysis Framework

Forest Health

The uniformity of the second growth forest across the Allegheny National Forest increases vulnerability of damage from repeated natural stresses and exotic insects or diseases (USDA-FS 2007b, page 3-93; Waring and O'Hara 2005). The decline of forest health within the Otter project area due to multiple factors and the challenges to regenerating native species are described in detail in the Purpose and Need section on pages 1–5.

Across all management areas currently about 3.8 percent (about 18,688 acres) of the Allegheny National Forest provides early structural habitat (zero to 20 years of age). This is less than a quarter of the amount (10-12 percent in management 3.0) of early structural habitat desired throughout the Allegheny National Forest, as identified in the Forest Plan (USDA-FS 2007a, page 19). Previously approved projects are projected to sustain 5.3 to 8.8 percent early structural vegetation on the Forest over the next 20 years. However, as forested stands on the Allegheny National Forest continue to age and a portion of early structural vegetation constantly develops into mid-structural vegetation, it is important to sustain and exceed this component through the creation of new early structural vegetation. The project area currently contains approximately 168 acres of early structural vegetation. The proposed action would contribute an additional 1621 acres of early structural habitat towards this goal within the project area.

Environmental Consequences

Indicator Measure 1: Effects of the alternatives on forest health, diversity of age and structural classes

Proposed Action

The Forest Service has proposed and implemented all of the elements of the proposed action elsewhere on the Allegheny National Forest in the past. The outcomes of these activities have been monitored and evaluated after implementation. The effects have been observed in past actions, are well-documented in monitoring reports and field work, and effects have generally occurred within the predicted range of the analyses. The rationale for the types of treatments proposed is well-described in Appendix A of the Forest Plan (USDA-FS 2007a).

This project is needed to address present and potential future decline of American beech, black cherry, and eastern hemlock due to non-native and native insects and diseases and other factors discussed below. If no action is taken, forest stocking levels may be reduced and could potentially result in areas with few to no seed trees and with forest understories dominated by interfering vegetation, including thickets of beech, striped maple, ferns, and glossy buckthorn. Stands with reduced stocking due to insects and diseases are more vulnerable to damage from wind throw, storms, and other general injury to tree crowns.

Vegetation management can affect forest health through a variety of overstory and understory treatments. Declining, mature, or poorly stocked stands can be regenerated to vigorous well-stocked young forest stands through a combination of timber harvest and reforestation treatments. Managing and regenerating declining stands now would promote natural regeneration of a diversity of desired trees. It would sustain healthy, well-stocked forested stands over the long-term. This project is designed to address project area forest health concerns by regenerating stands before natural regeneration opportunities are further reduced. Deferring action of these stands would likely increase the difficulty of successfully restocking the stand with diverse tree seedlings that would result in a more resilient future forest.

Vegetation within the project area is relatively uniform in age, structure, and maturity. Approximately 77 percent of trees in the project area are more than 81 years old, and an additional 2 percent are between the ages of 51 and 80. Most trees are fully developed, and most stands have achieved a relative uniformity in terms of the horizontal and vertical structure. Combined, this creates forest health challenges since trees become more predisposed to stress and mortality from insect and disease infestations as they age, and stands with high levels of uniformity are more vulnerable to natural stresses. To address uniformity, the Forest Service focuses on regenerating stands to improve tree species diversity, resilience, vigor, and early age class distribution. Increasing diversity, resilience, vigor, and early age class distribution, in turn, improves forest health by reducing stands that are unhealthy and at risk of declining. Regenerating stands also reduces the susceptibility of blowdown more than other mature stands that have not been treated.

Timber harvesting would improve resilience of stands and contribute to achieving Forest Plan objectives for diversity of age and structural classes as a result of several effects. Horizontal and vertical diversity of vegetation structure would be enhanced throughout in the project area. Shade-intolerant and mid-tolerant species such as red oak, yellow poplar, black cherry, red maple, and cucumbertree would be favored by timber harvest. These species thrive in partial to full sunlight conditions and characterize the hardwood communities presently found in the project area. Shelterwood seed cuts would improve site utilization, seedling presence, and species richness in high-mortality stands by creating more even light levels at a desired tree density. Stand vigor would be improved, and harvested stands would be more resilient to future disturbance.

Herbicide treatments, in combination with even-aged regeneration harvests, would reduce competing vegetation (fern, grass, striped maple, glossy buckthorn, and beech), which often prevents tree seedlings from becoming established in the understory. Because growing space is made available following an herbicide treatment; a wider range of plant communities would be expected to occupy the understory. This would help to restore understory diversity and abundance. This could include tree species as well as

shrubs, forbs, and wildflowers, which are not currently present. Species targeted by herbicide would be reduced in abundance, but would persist in smaller numbers within the stand and in areas where herbicide would not be applied. The effect of herbicide is temporary, creating a window of opportunity for other species to become established and many of those species initially reduced in abundance would quickly repopulate the treated areas.

The proposed action would increase (from current levels) the amount of early structural habitat within the project area from 1.4 to 13.5 percent and across the Allegheny National Forest by 0.3 percent over the next 20 years. It would also help to restore and maintain forest health throughout the project area, limiting the further introduction and spread of non-native invasive plant species, and enhancing wildlife habitat and improving habitat diversity by reducing non-native invasive plant species and establishing desired vegetation. The proposed action would enhance the resiliency of the forest by providing diverse vegetation patterns across the landscape to represent well-distributed habitats, a range of forest age classes and vegetative stages, a variety of healthy functioning vegetation layers, moderate-to-well stocked forest cover, and the variety of vegetation species and forest types necessary to achieve multiple resource objectives and sustain ecosystem health (USDA-FS 2007a, page 14). Not taking any action would limit our ability to treat the health concerns the project area faces.

No Action

Most trees are fully developed, and most stands have achieved a relative uniformity in terms of the horizontal and vertical distribution of vegetation layers. If stands in poor health are left untreated, stand health would continue to decline and more trees could die from insect and disease infestations, and other stressors. Stand structure would become more uniform as stands grow out of the younger age classes. We also considered the possibility of salvaging dead and dying trees in these stands without any reforestation activities to promote diverse, desirable tree seedling establishment. This approach, however, is not prudent and would not achieve the project purpose and need since stand health would continue to decline. Without stand regeneration and reforestation activities that would result in these larger openings, the number of stands with stocking levels of desirable tree species and understory diversity would continue to decline, and our ability to naturally regenerate a younger cohort of diverse, hardwood species would be jeopardized. Either way, without treatment, diversity, resilience, and vigor would continue to decline and the acres of early age classes would continually be reduced across the project area.

Changes currently taking place due to disease and age would continue, although the rate of change would vary depending on the interaction of natural forces, such as drought, insect defoliations, and windstorms, as well as human-caused forces, such as the spread of invasive pests or diseases. Competition from non-native invasive plant species is also a threat to forest health and native plant communities. Monitoring and controlling the spread of invasive plant species is an important component of providing a healthy, sustainable forest ecosystem. Canopy gaps resulting from mortality will continue to occur in stands with a component of unhealthy overstory trees. Gaps will be filled by a multitude of species, including birch and red maple, along with undesired invasive species, striped maple, American beech, gloss buckthorn, and fern species. The new species composition would look very different than that of the current overstory.

Wildlife and Sensitive Plants

Analysis Framework

The analysis frameworks for three categories of wildlife and sensitive plants are presented in Biological Assessment for Threatened and Endangered Species and Biological Evaluation and Wildlife Analysis Report for Region 9 Regional Forester's Sensitive Species and species with viability concerns (listed in the Forest Plan [USDA-FS 2007a, Appendix D, pages D-1 – D-4]).

Environmental Consequences

Indicator Measure 2: Effects to Federal threatened or endangered species or designated critical habitat

Proposed Action and No Action

Effects to nine threatened or endangered species as listed under Federal Endangered Species Act are presented in project wildlife and botany reports and summarized below. This wildlife and botany reports includes a general description of habitat within the project area and a description of specific habitat for threatened and endangered species, followed by an analysis of potential effects associated with each alternative considered in the environmental assessment. The wildlife and botany report evaluates the effects of alternatives in order to determine potential effects to threatened and endangered species (USDA-FS 2005a, Forest Service Manual [FSM] 2670.31).

Table 8—Effects determinations for species addressed in the biological assessment

Species	No Action	Proposed Action
northern long-eared bat	No Effect	May affect, likely to adversely affect.
small whorled pogonia	No Effect	No Effect
northeastern bulrush	No Effect	No Effect
northern riffleshell	No Effect	No Effect
clubshell	No Effect	No Effect
rayed-bean	No Effect	No Effect
sheepnose	No Effect	No Effect
snuffbox	No Effect	No Effect
rabbitsfoot	No Effect	No Effect

Indicator Measures 3: Effects to Regional Forester Listed Sensitive Species and species identified as having viability concerns listed in the Forest Plan

Proposed Action and No Action

Effects to 70 Regional Forester's Sensitive Species for which viability has been identified as a concern (USDA-FS 2005a, FSM 2670.32) are presented in project wildlife and botany reports and summarized below. These reports analyze the significance of the potential adverse effects on populations or habitats within the area of concern and on the species as a whole if impacts cannot be avoided (USDA-FS 2005a, FSM 2670.32).

Table 9—Effects determinations for species addressed in the biological evaluation

Sensitive species	No Action	Proposed Action
Mammals		
little brown myotis, northern flying squirrel, tri-colored bat	No Impact	May adversely impact individuals but is not likely to cause a loss of viability in the Planning Area, nor cause a trend toward federal listing.
Birds		
northern goshawk, Swainson's thrush	No impact	May adversely impact individuals but is not likely to cause a loss of viability in the Planning Area, nor cause a trend toward federal listing.
Fish		
burbot, mountain madtom, northern madtom, Ohio lamprey, spotted darter,	No impact	No impact
mountain brook lamprey	No impact	May adversely impact individuals but is not likely to cause a loss of viability in the Planning Area, nor cause a trend toward federal listing.
Plants		
awned sedge, blue wild indigo, bristly black currant, creeping snowberry, false Indian plantain, Philadelphia panicgrass, queen-of-the-prairie, stalked bulrush, thread rush, tufted hairgrass, twining screwstem	No impact	No impact
American ginseng, Autumn coralroot, Bartram shadbush, blazing star/fairywand, blunt-lobed grapefern, boreal bog sedge, boreal starwort, butternut, Canada yew, checkered rattlesnake plantain, crippled crane-fly, great-spurred violet, Hooker's orchid, lanceleaf moonwort, large toothwort, least moonwort, lesser rattlesnake plantain, mountain wood fern, red baneberry, rough cotton-sedge, showy orchid, strict blue-eyed grass, swamp red currant, white fawnlily, wild quinine	No impact	May adversely impact individuals but is not likely to cause a loss of viability in the Planning Area, nor cause a trend toward federal listing.
Aquatic invertebrates		
long-solid mussel, rainbow mussel, rapids clubtail, round pigtoe, ski-tipped emerald, threeridge, Wabash pigtoe, white heelsplitter	No impact	No impact
creek heelsplitter, green-faced clubtail, harpoon clubtail, Maine snaketail, mocha emerald, mustached clubtail, sable clubtail, zebra clubtail	No impact	May adversely impact individuals but is not likely to cause a loss of viability in the Planning Area, nor cause a trend toward federal listing.

Sensitive species	No Action	Proposed Action
Terrestrial invertebrates		
eyed-brown, Monarch butterfly, West Virginia white	No impact	May adversely impact individuals but is not likely to cause a loss of viability in the Planning Area, nor cause a trend toward federal listing.
Amphibians and Reptiles		
eastern hellbender	No impact	No impact
four-toed salamander, wood turtle, timber rattlesnake,	No impact	May adversely impact individuals but is not likely to cause a loss of viability in the Planning Area, nor cause a trend toward federal listing.

Proposed Action and No Action

Potential effects to species with viability concerns listed in the Forest Plan (USDA-FS 2007a, Appendix D, pages D-1–D-4) and are provided project Wildlife Report and summarized below.

Table 10—Additional species with viability concerns and their status

Species with Viability Concerns	Documented in the Project Area	Suitable Habitat
Birds		
black-throated blue warbler	Yes	Yes
Cerulean warbler	No	Yes
golden-winged warbler	No	Yes
great blue heron	Yes	Yes
Henslow's sparrow	No	No
osprey	No	No
raven	Yes	Yes
red-shouldered hawk	Yes	Yes
Reptiles		
coal skink	No	Yes
eastern box turtle	No	Yes
Amphibians		
Jefferson salamander	No	Yes
Plants		
Wiegand's sedge	No	Yes

A review of the 12 species with viability concerns listed in Table 10 indicates that there would be no adverse effects or cumulative effects to these species, but habitat for some may be altered. Slight increases or decreases in potential habitat would occur, but adequate amounts of suitable habitat would remain for these species. Forest Plan standards and guidelines (USDA-FS 2007a, pages 80–88) would protect specialized habitat and features for several of these species. If any active nests or occurrences of these species are observed during implementation of this project, Forest Plan standard and guidelines will be followed to protect these species.

Non-native Invasive Plants

Analysis Framework

Twenty-two (22) non-native invasive plant species of concern have been found in the project area (see Appendix B, Table B-4). The primary threat in the Otter project area is from glossy buckthorn (*Frangula*

alnus). A highly aggressive invasive plant that dominates and influences a wide variety of habitat and vegetative conditions, often crowding out native trees and shrubs that produce nutritional hard and soft mast. With fruit that has little or no nutritional value, buckthorn has begun to displace native shrubs that provide wildlife with the nutrients needed for their life cycle. As a result, the Marienville Ranger District has begun implementation of the Marienville Buckthorn Treatment decision in some areas on the district and will continue to implement it in conjunction with and to supplement the non-native invasive plant species treatments proposed within the Otter project area.

Proposed non-native invasive plant species treatments include utilizing a combination of manual/mechanical treatment (for example, hand pulling, clipping, digging) and/or herbicide (for example, backpack foliar, cut-stem) application of glyphosate and/or sulfometuron methyl. The method of treatment is determined by species, size of infestation, and site conditions at the time of treatment.

Herbicide use is permitted in all management areas to treat native and non-native invasive plants (USDA-FS 2007a, page. 35). Herbicide treatment of non-native invasive plant species within the project area would entail the use of backpack sprayers for spot-treatment of small, scattered locations (infestation areas typically less than 10 square feet). Only aquatic labeled glyphosate formulations would be used in areas near surface waters with appropriate buffers as prescribed in current Forest Plan standards and guidelines (USDA-FS 2007a, pages. 54-59). These standards and guidelines are based on the Human Health Risk Assessment completed for the Forest Plan Final Environmental Impact Statement, Appendix G (USDA-FS 2007b). Appendix A of the Forest Plan (USDA-FS 2007a, pages. A-43–A-45) contains additional information on site selection, herbicide selection, and application methods and rates.

Anticipated Non-native Invasive Plant Species Response

Indicator Measure 4: Effects that may cause or promote the introduction or spread of non-native invasive plant species

Under the no action and proposed action alternatives, existing non-native invasive plant infestations that are not treated are anticipated to persist and spread.

Even-aged, Uneven-aged, and Understory Vegetation Management

Proposed shelterwood seed cut, overstory removal, shelterwood removal, group selection, and single tree selection silvicultural treatments across 1,162 acres would temporarily increase the amount of light radiating to the forest floor in varying amounts, depending on the extent of the canopy closure removed, enhancing the growing conditions for shade intolerant non-native invasive plants found on the Allegheny National Forest. Suitable light conditions for these non-native invasive plant species would occur for approximately 5 to 15 years after the final timber harvest or until small trees and shrubs reestablish (USDA-FS 2007b, page 3-292).

Herbicide application is proposed on 1,159 out of 1,205 acres of shelterwood removals, 244 out of 268 acres of overstory removal, and all areas of single tree, group select, and advance mature forest condition silvicultural treatments, if needed, to eliminate interfering vegetation and non-native invasive plants prior to proposed timber harvests. One thousand five hundred fifteen (1,515) acres out of 1,585 acres proposed for herbicide application in these silviculture treatment areas could have herbicide applied multiple times in the same area due to the presence of *Frangula alnus* (glossy buckthorn) in the project area. Glossy buckthorn, a fast growing invasive woody tree species, is currently found in many of the proposed silviculture stands and along road corridors throughout the project area. Vegetation removal facilitates the establishment of glossy buckthorn by creating highly suitable growing conditions with a reduction in canopy cover; however, glossy buckthorn is also capable of establishing in undisturbed closed canopy

conditions (Lee and Thompson 2012). Herbicide treatments would reduce glossy buckthorn and other non-native invasive plant infestations present within the stands at the time of application.

Sixty-seven (67) acres of herbicide for non-native invasive plant treatments are proposed in the project footprint for roadsides, wildlife openings, and recreation sites. Additional herbicide use within the project area for non-native invasive plant treatment is possible utilizing the Marienville Buckthorn Treatment decision.

Soil disturbance from timber harvesting operations, such as the use of dozers and skidders, creates suitable growing conditions for weed seeds present in the seed bank. More frequent soil disturbances allow light to reach buried weed seeds that could germinate more readily than if they were to stay buried. (Jensen 1995; Wesson and Waring 1969). Skid trails and landings should be placed in weed free areas if possible, otherwise weed propagules are likely to spread throughout the timber stand during harvesting operations and might be spread across the project area via vehicle transmission. Contract clauses have measures requiring equipment inspection and cleaning prior to off-road use on National Forest System lands limiting the transmission of weed propagules and potentially preventing the expansion of nearby weed species not currently found on National Forest System lands. Equipment used solely for on-road use is not inspected, however.

Site preparation, fence construction, tree shelter installation, tree planting for species diversity, and release for species diversity are expected to have no effect to non-native invasive plant spread or establishment because of the minimal amount of disturbance associated with these actions.

Wildlife Management

Sixteen (16) acres of prescribed burning are proposed for wildlife treatments within established openings, which can have a multitude of effects on non-native invasive plants present within the prescribed burn area depending on the plant species' fire ecology. For example, fire is ineffective at treating glossy buckthorn (Miller, Manning, and Enloe 2013). The option to use prescribed fire to maintain wildlife openings would include an assessment for non-native invasive plant presence and abundance and managed accordingly, including the proposed use of herbicide, if needed. Goals for prescribed fire as listed in the "Forest Service Guide to Noxious Weed Prevention Practices" would be followed. Prescribed fire is not expected to increase the spread or density of non-native invasive plant infestations.

Brush pile creation, wildlife structure placement, tree and shrub planting, and fencing would also have no effect on non-native invasive plants due to the limited amount of soil disturbance associated with these actions.

Aquatic Habitat Treatments

Large wood introductions and riparian plantings are expected to have a negligible effect on non-native invasive plants as minimal soil disturbance is expected.

Soil and Water Quality Improvement

Two hundred seventy two (272) acres are proposed for lime application with a skidder within forested stands. Some soil disturbance is expected with skidder use that may contribute to non-native invasive plant establishment or spread and the increase in pH, calcium, and magnesium from the lime soil amendment might temporarily benefit some non-native invasive plant species. No appreciable increase or expansion of non-native invasive plants is expected from lime application.

Recreation Improvements

Recreation improvements are expected to have a negligible effect on non-native invasive plants as minimal soil disturbance is expected. Closing and restoring some user developed camping sites may reduce the incidence and opportunity for the spread on non-native invasive plants. Blocking illegal off-road ATV use would help prevent the spread of non-native invasive plants.

Travel Management

Typical new road construction requires 25 feet of clearance around the road and would include the removal of trees whereby increasing the amount of light that hits the ground along the newly created road. Because roads are one of the main pathways for weed propagules, non-native invasive plant establishment along the newly created corridors can be expected especially for those species which are shade intolerant.

Surveys identified non-native invasive plants along the roads proposed for decommissioning. These infestations could expand to the adjacent roadbed due to the ripping action of an excavator exposing soil for seed establishment and the proximity of available weed propagules.

Road reconstruction and maintenance that causes soil disturbance might contribute to non-native invasive plant establishment or spread depending on a variety of factors including the presence of weed seed. Additionally, proposed limestone amendments to road surfaces on 14.3 miles might contain weed propagules if the limestone quarry product harbors non-native invasive plant infestations.

Disturbance from general motorized use and recreational access would continue throughout the project area. Motorized use can increase the spread of non-native invasive plants through providing vectors for these species, especially in cases where unauthorized off trail use occurs.

Private Oil and Gas Development

Based on deep well pad development on the Allegheny National Forest in recent years, one deep well pad may be development in the Otter project area in the next 20 years. Disturbance for deep well pads is anticipated to be up to 10 acres.

Oil and gas development results in alteration of habitat resulting in an increase in opening and edge habitat (non-forest). The change from forested to non-forested conditions are likely to exacerbate the spread of non-native invasive plants.

Soils

Analysis Framework

Soil Resources

The Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, pages 3-7 and 3-8) describes the origin and condition of soils on the Allegheny National Forest, as well as potential effects to soils from management activities in terms of (1) soil nutrients; (2) soil erosion; and (3) soil compaction, puddling, and rutting (USDA-FS 2007b, pages 3-7–3-21). These general effects are incorporated by reference in this analysis.

One of the goals of the Forest Plan (page 14) is to manage soil disturbance resulting from management activities so that they do not cause long-term loss of inherent soil quality and function. This analysis assumes that all proposed activities would be consistent with Forest Plan standards and guidelines, Pennsylvania best management practices, and project design features, as well as all other applicable laws, regulations, and policies. The Forest Service manual describes seven categories of soil disturbance that

may result from forest management activities: 1) compaction, 2) displacement, 3) puddling/rutting, 4) burned (which is directly related to the intensity of the fire), 5) eroded, 6) lack of ground cover, and 7) mass movement (USDA-FS 2012, page 3). These potential soil disturbances could result in detrimental soil conditions such as a long-term loss of soil organic matter, impaired nutrient cycling, and alteration of soil air and moisture relationships, as well as hydrologic functions. Loss of soil material, through erosion or mass movement, may result in off-site environmental impacts. Long-term soil productivity would be maintained through timing of treatments (seasonal restrictions), by reestablishing vegetation on disturbed areas, and through natural processes.

Soils known as “prime farmland” and “farmland of statewide importance” are designated by the USDA-Natural Resource Conservation Service. The project area includes approximately 6,902 acres of designated farmland (48 percent of the National Forest System lands within the project area), and the proposed action includes activities on designated farmland soil map units. Agricultural use is not designated in the Forest Plan for any of these lands, nor would any farm use occur as part of future projects.

This analysis compares the potential effects of the proposed activities with the no action alternative, including the amount and category of soil disturbance and the likelihood of short-term effects (3 years or less) and long-term soil impairment (beyond 3 years). The extent and intensity of soil disturbance and potential effects to soil resources from some proposed activities are minor (not measurable); therefore, these activities will not be analyzed further, including: non-commercial, site preparation, planting, release, manual/mechanical non-native invasive plant treatments, wildlife structure installation, mowing, large wood introductions (into streams), non-commercial aspen regeneration, and fruit tree pruning and release.

Proposed activities that do influence soil resources include: timber harvest and log skidding, herbicide application, forest stand liming, fence construction, scarification, opening enhancements (other than mowing), prescribed burning, and road construction, reconstruction, and maintenance. This comparison considers site-specific effects of the proposed activities as well as general effects analyzed in the Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, pages 3-7–3-21). Descriptions and maps of soil types in the project area are provided in the project file.

Soil Groups and Sensitive Soils

Table 11 lists the acreages of stands overlaying groups 1, 2, and 3 soils which are proposed for treatment. Group 1 soils are well-drained. Group 2 soils are intermediate in drainage characteristics, but can become susceptible to compaction when saturated or as a result of the freeze-thaw cycle. Group 3 soils are poorly-drained and highly susceptible to compaction (USDA-FS 2007a, page 73). Within the project area, group 2 soils are common while group 3 soils are infrequent. Many of these soils are typed as Atkins (At), Brinkerton (BrA, BrB, BsB), Buchanan (BuB, BuC, BuD, BxB, BxD), Cavode (CaA, CaB, CaC, CdB, CdD), Cookport (CoA, CoB, CoC, CpB, CpD) Nolo (NoA, NoB, NxB), Philo (Ph), and Wharton (WaB, WaC, WaD, WxB, WxD). These soils have limitations because some of the soils are in high water tables, have fine textures, or impermeable layers (fragipans) at shallow depths that restrict water movement. This can cause the soils to remain moist well into the summer (USDA-FS 2007b, page 3-14).

Table 11–Acres of groups 1, 2, and 3 soils proposed for treatment

Soil Group	Acres
1	425
2	1,042
3	112

Environmental Consequences

Indicator Measure 5: Effects that may result in permanent conversion of Natural Resources Conservation Service-designated prime farmland to other uses

Proposed Action

Proposed road construction (new-corridor and reconstruction-realignment) in the proposed action would result in long-term losses (2.2 miles [9.2 acres]) of land designated as prime farmland and farmland of statewide importance. These roads are proposed to provide access for vegetation management. Also, the proposed action includes the decommissioning of roads (4.8 miles [20.3 acres]) on land designated as prime farmland and farmland of statewide importance, offsetting the net long-term losses of designated farmland.

Except for proposed road construction (new-corridor and reconstruction-realignment), none of the proposed activities remove topsoil, cover the surface, or otherwise impair land designated as prime farmland or farmland of statewide importance, or convert land managed as forest to non-forest or non-agricultural use.

No Action

Agricultural use is not designated in the Forest Plan for any of these National Forest System lands. Under the no action alternative, there would be no soil disturbance removing topsoil, covering the surface, or otherwise impairing land designated as prime farmland or farmland of statewide importance, nor would it result in any conversion of land managed as forest to non-forest or non-agricultural use.

Cumulative Effects

Because vegetation management activities do not permanently convert farmland (currently forested) to other uses, these activities do not contribute to any cumulative conversion of farmland to other uses. However, the proposed action includes road construction (new corridor and reconstruction-realignment) which will result in the permanent conversion of 9.2 acres of designated prime farmland and farmland of statewide importance. The proposed action includes the decommissioning of roads on 20.3 acres of designated prime farmland and farmland of statewide importance, including National Forest System and non-system roads, offsetting the impact from the new road construction and reconstruction-realignment for a net proposed reclamation of 11.1 acres of designated farmland.

The location of projected future private oil and gas development cannot be determined in advance. Private oil and gas development on private and National Forest System lands may result in the conversion of farmland to non-forest or non-agricultural uses (access roads and well pads).

Indicator Measure 6: Effects to soils designated by the Forest Service as sensitive (groups 2 and 3)

Proposed Action

Direct and Indirect Effects

Adverse effects to group 2 and 3 soil types would be reduced or eliminated because timber harvest activities would be restricted to dry or frozen conditions, perennially wet areas would be avoided, use of heavy equipment would be avoided, and low ground-pressure equipment would be used as appropriate. On soils susceptible to mass movement when loaded, excavated, or wet, use of heavy equipment on slopes greater than 15 percent would only occur when soils are dry. If the risk of landslides during these periods of concern cannot be mitigated, activities would be prohibited (USDA-FS 2007 a, page 72).

General effects to soil nutrients and to soil erosion, compaction, puddling, and rutting are described below.

Potential effects to **soil nutrients** are described in the Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, pages 3-11–3-13). Specific proposed activities that may affect soil nutrients include timber harvest, forest stand liming, prescribed fire, and herbicide application. The Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, pages 3-7–3-8) recognizes and describes the process of soil acidification occurring on the Allegheny National Forest due to acid deposition, also called acid rain. Acidification occurs because minerals such as limestone and dolomite which contain base cations (physical properties of elements that help to buffer soil acidity) are naturally rare as geologic components of the Allegheny National Forest. These minerals increase the capacity of soil to buffer the effects of acid deposition. Without this buffering capacity, soils on the Allegheny National Forest are highly susceptible to becoming even more acidic. The bulk of acid deposition on the Allegheny National Forest is the result of sulfur dioxide and nitrogen oxide emissions near the Forest, and to a great extent, transported from the Ohio River Valley (USDA-FS 2007b, page 3-53).

Proposed timber harvests would remove only merchantable trunks, leaving half of the nutrients in trees (branches, leaves, tree crowns) on-site to be recycled (USDA-FS 2007b, page 3-11). Treetops that remain after stem removal store nutrients and release them slowly over time. Additional base cation depletion is not expected following site changes from timber extraction (USDA-FS 2007b, page 3-11).

Proposed liming of forest stands will raise soil pH and replenish base cations, both of which have been lowered through acidification.

Proposed road construction and reconstruction-realignment (2.9 miles [12.3 acres]) in the proposed action would result in long-term losses in soil productivity where soils are removed or buried. Proposed road decommissioning (11.0 miles [46.7 acres]) conducted in conjunction with the proposed road construction and reconstruction would reduce and offset cumulative effects.

Proposed prescribed fire (for wildlife opening enhancement [warm season grasses]) would result in short-term reduction of ground cover and may increase soil pH. However, the proposed prescribed burning in the proposed action would be of low-intensity and any impacts would be short-term and only last until revegetation occurs (USDA-FS 2007b, page 3-14). Low intensity fires can facilitate nutrient cycling and increase availability of some plant nutrients.

Glyphosate herbicide binds readily to soils and becomes relatively immobile, so there is limited potential for residual effects or effects to soil nutrients (USDA-FS 2007b, page 3-33). Sulfometuron methyl herbicide remains relatively mobile, but has a relatively rapid half-life in acidic soils such as those found on the Allegheny National Forest (USDA-FS 2007b, page 3-12). It also is more strongly adsorbed to acidic soils. The Forest Plan Final Environmental Impact Statement determined that with the application rates used on the Allegheny National Forest, the herbicides, glyphosate and sulfometuron methyl, would not adversely affect soil nutrient cycling, soil microorganisms, or soil productivity (USDA-FS 2007b, pages 3-12 and 3-14; and Appendix G, pages G1-42 to G1-44 and G1-104–G1-106). A review of the literature suggests that use of glyphosate in forests, especially at typical application rates used to control striped maple, American beech, and hayscented and New York fern, does not have lasting impacts on the fungal components in the soil (see the project file).

Potential effects of **soil erosion, compaction, puddling and rutting** are described in the Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, pages 3-13–3-15). Soil erosion is a natural process by which soil and rock are removed by processes such as wind or water flow, and then transported and deposited in other locations. Accelerated erosion may occur in any area that is stripped of

vegetation, and these effects may also result from compaction, puddling and rutting where vehicles pass repeatedly. Therefore, these effects are discussed together. Specific proposed activities that may affect soil erosion include timber harvest, road construction and reconstruction, prescribed burning, and scarification.

Soil disturbance associated with timber harvest would cause moderate to low amounts of accelerated erosion by removing the vegetation and organic matter that protects the soil surface from raindrop impact. However, in a managed forest, erosion remains low due to the relatively long interval between treatment activities. Harvest equipment can compact the soil, reducing soil porosity and infiltration rates. Severe rutting, which concentrates sheet flow of water into rills and gullies can result in accelerated erosion. Where log skidding occurs, skid trails are usually approximately 12 feet wide. These trails would be ripped or subsoiled (plowed to the depth of the subsoil to reduce soil density) after use, and drainage would be directed off of skid trails using water bars or logs. Seasonally restricting timber harvest activities to dry or frozen conditions, use of low ground pressure equipment, and avoiding perennially wet areas and steep slopes would reduce the potential for long-term soil compaction and accelerated erosion. The upper few inches of soil recovers quickly from light to moderate compaction due to organic matter additions from logging debris, soil biota activity, freezing and thawing, and plant root growth from existing and new vegetation.

Other vegetation management practices that utilize heavy equipment (such as a modified skidder) for application, such as liming and herbicide application, can compact the soil and cause rutting. These activities do not remove the organic matter layer and maintains a vegetative cover that protects the soil from raindrop impacts, greatly reducing the susceptibility of erosion compared to timber harvest activities. Seasonally restricting heavy equipment operation to dry or frozen conditions, use of low ground pressure equipment, and avoiding perennially wet areas would reduce the potential for long-term soil compaction.

The proposed addition of non-system roads (road construction—existing corridor) to the Forest Service System under both action alternatives would reduce the potential for erosion by constructing and maintaining these road segments to a higher standard. System roads are considered dedicated land uses and are not considered part of the disturbed soil condition (the 15 percent).

Road maintenance and use can cause accelerated erosion levels by changing rainfall impact on road and soil surfaces and surface runoff on roadbeds. Road maintenance can cause temporary increases in erosion and sedimentation, but will typically reduce erosion over the long term. Mitigations such as improved drainage and more resistant surfacing can reduce the amount of road-related erosion, or at least reduce sedimentation in nearby waterways. Short-term increases in erosion may occur during implementation of road maintenance, but overall sedimentation is expected to decrease with time. Armoring of road surfaces (14.3 miles in the proposed action) with limestone or other durable material would also reduce the potential for erosion.

No Action

Because the rate of acid deposition on the Allegheny National Forest is not connected to any project activities associated with this project or any other Forest Service project, acidification would continue to occur under the no action alternative. Down woody debris would accumulate with time as trees die as a result of natural thinning due to a lack of adequate resources, blowdown, insects or disease. The main stems of dead trees that have fallen to the ground would decompose much more slowly and provide these same benefits as treetops and other logging slash but for a much longer time period.

Routine road maintenance on Forest Service road corridors would occur as funding and management priorities permit. Potential short-term effects include increases in soil movement during road maintenance

activities. However, these activities would stabilize roadside soils and reduce erosion potential in the long term.

Cumulative Effects

The location and potential effects to sensitive soils from projected private oil and gas development on private and National Forest System lands cannot be determined in advance. Because proposed and previously approved vegetation management activities do not result in permanent loss of vegetative cover and Forest Plan standards and guidelines, Pennsylvania best management practices, and project design features reduce or eliminate adverse effects (accelerated soil erosion, compaction, puddling and rutting), these activities are unlikely to contribute to any cumulative adverse effects when considered in the context of private oil and gas development and other soil-disturbing activities occurring on private lands within the project area. Routine road maintenance are unlikely to contribute to long-term cumulative accelerated erosion or soil loss.

Hydrology

Analysis Framework

Water Resources

The project area lies within the Big Mill Creek (a municipal watershed [Ridgway, Pennsylvania]), Little Mill Creek, and Bear Creek watersheds. The project area includes the following streams: Big Mill Creek, Bloody Run, Bunts Run, Otter Run, Pine Run, Red Mill Run, Rocky Run, and Spencer Run. All of these streams are classified as High Quality Cold Water Fisheries by the Pennsylvania Department of Environmental Protection. The streams within the project area are relatively small in size and are heavily forested. Rocky Run and Bloody Run have been listed as impaired streams list (PA DEP 2016a). These streams are listed as impaired by low pH caused by atmospheric deposition. Similar to other 1st and 2nd order headwater streams on the Allegheny plateau, these streams have a naturally low pH and poor buffering capability due the area's iron-based sandstone geology. In addition, this region of the country receives some of the most acidic precipitation found anywhere in the nation.

Forest Plan standards and guidelines, project design criteria, and Pennsylvania best management practices are designed to maintain and protect the high-quality cold water fisheries. Riparian corridors, will be identified along all stream and include the area within 100 feet from any perennial streams, and 50 feet from intermittent streams. Riparian corridors serve as buffers from activities and streams, (Hornbeck and Swank 1992) and protect streams from sediment and associated nutrients through a rough, porous forest floor and litter layer (Stuart and Edwards 2006). Riparian corridors make up 7 percent (1,055 acres) of the project area.

Forest Plan standards and guidelines and Pennsylvania best management practices will also be implemented to protect wetlands. Activities will exclude wetlands direct impacts and will avoid indirect impacts using buffers. Wetlands, springs and seeps would be protected with a 25-foot no activity buffer and a 25 to 100 foot zone from these resources where 50 percent canopy cover would be maintained. Vernal pools would be protected with a 100-foot no activity buffer and a 100 to 200 foot zone where 50 percent canopy cover would be maintained. There are about 326 acres of wetlands in the project area (about 3 percent of the project area), most occurring in the Big Mill Creek.

Forest Plan standards and guidelines (USDA-FS 2007a) would be applied to all Forest Service activities to protect and maintain water quality and quantity. The Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, pages 3-22 to 3-51) provides documentation, which demonstrates minimal effects to

water temperature, buffering capacity, nutrient concentrations, and sediment concentrations from vegetation management and reforestation activities.

Environmental Consequences

Indicator Measure 7: Effects to water quality and water quantity

Direct and Indirect Effects on Water Quality and Water Quantity

Proposed activities that do influence water resources include: road construction, reconstruction, maintenance, and decommissioning, timber harvesting, herbicide application, prescribed burning, forest liming, and large wood introduction.

Road Construction, Reconstruction, and Maintenance within 300 Feet of Streams

Proposed Action

Sedimentation from roads for water quality and runoff from roads for water quantity were analyzed in the Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, pages 3-36 to 3-37 and 3-39 to 3-40). New road construction, road reconstruction, and hauling on roads within 300 feet of streams have the greatest potential for adverse effects to water quality and water quantity (USDA FS 2007b, pages xyz). Existing non-Forest Service system road corridors within 300 feet of streams that are converted to Forest Service system roads could reduce sedimentation and runoff where roads are improved to Forest Service standards. Road best management practices will be implemented during maintenance and construction that helps the road shed the water to filtering areas, provide for a durable road surface, and allow for the passage of flood flows at stream crossings. Placing limestone on roads within 300 feet from streams can reduce sediment loads compared to pit-run surfaced roads.

The proposed action includes 1.2 miles of new road construction and 0.4 miles of road realignment that includes new construction. This is not expected to cause changes to water quality as only 0.1 miles of road realignment would be within 300 feet of streams.

No miles of existing roads will be reconstructed within 300 feet of streams. Road maintenance activities would occur on approximately 14.3 miles of roads within 300 feet of streams. Proposed road maintenance within 300 feet (14.3 miles) would reduce sedimentation and runoff over the long term and improve water quality and impacts to the stream flow regime by decreasing runoff into streams (Scheetz and Bloser 2008). Where road work occurs within 300 feet of streams, there may be direct and indirect effects from the short-term increase in sedimentation or runoff, but this would be minimized through the addition of limestone durable surfacing and frequently diverting runoff into effective filter areas (Scheetz and Bloser 2008). After the roads are stabilized and vegetation returns, the sedimentation and runoff would reduce to normal levels. While these may cause a temporary increase in sediment during construction, over the long term this will reduce the hydrologic connectivity of roads to streams resulting in a reduction in the volume of road-derived runoff and sediment entering area streams.

Road maintenance is likely to occur at a faster rate under the proposed action because funds would be generated from timber sales to improve road condition; therefore, there would be a greater reduction in sedimentation and runoff. Maintenance of Allegheny National Forest system roads within 300 feet of streams would divert road runoff into effective filter areas to reduce sediment and runoff delivery to streams. Commercial surfacing would reduce the impacts of the heavy truck traffic for hauling timber. Limestone durable surface aggregate would be applied on 14.3 miles roads within 300 feet of streams where needed to reduce sedimentation. Limestone durable surface aggregate application may provide a beneficial effect to water chemistry through the addition of base cations (e.g., calcium and magnesium) to

the local watershed, which would have the potential to help buffer nearby streams against episodic and chronic acidification. In addition, applying limestone sand to the ditch lines on existing and new roads at stream crossings would provide increases in alkalinity.

Road decommissioning is proposed on 11.1 miles of road. There are 5.8 miles of roads that will be decommissioned within 300 feet of streams. Road decommissioning will restore natural flow patterns of surface water runoff. There will be improvements to water quality where these sections of roads are contributing runoff to streams. When roads are restored by decommissioning, there is less soil erosion and increased infiltration.

No Action

No road construction or reconstruction would occur. Road maintenance activities would reduce hydrologic connectivity of roads to streams resulting in a reduction the volume of road derived runoff and sediment entering area streams. In comparison with the proposed action, however, less road maintenance would occur and it would occur at a slower rate. Road decommissioning would not occur and water quality would continue to be impacted by road runoff.

Basal Area Reduction

Proposed Action

Basal area reductions would occur through proposed and previously approved timber harvesting activities. Timber harvesting activities have the potential to impact water quality or water quantity. The effects to water quality and quantity are mitigated by Forest Plan standards and guidelines, as well as forestry best management practices (PADEP 2005). Research has shown that removal of vegetation through timber harvesting can alter evapotranspiration rates and lead to changes in water quantity in watersheds. These altered evapotranspiration rates result in changes in streamflow. Research has indicated that measurable changes to stream flow are predicted to occur when more than 25 percent of a watershed changes from forested to regenerating forest in a 5 year period (Hornbeck and Kochenderfer 2000; Lynch and Corbett 1990). A study of northern hardwoods in the Catskill Mountains in New York found that reductions of basal area by more than 40 percent could also lead to a release of elevated nitrate (NO_3)-nitrogen (N) concentrations (Siemion and others 2011). The increase in nitrate-nitrogen is due to a lack of uptake of nitrogen by the vegetation that was removed. In watersheds where more than 68 percent basal area was removed, Aluminum concentrations sampled in the stream exceeded a known brook trout mortality threshold (Siemion and others. 2011). The value of 25 percent basal area reduction over a watershed serves as a goal for minimizing changes to water quantity, and is not a set threshold beyond which impairment would occur (Hornbeck and others 1993, Hornbeck and Kochenderfer 2000, Siemion and others 2011). If the 25 percent value were exceeded slightly, streamflows would increase slightly during the low flow seasons, which may be beneficial to water quantity. By minimizing the impacts to streamflow from timber harvest, water quality of streams would be maintained. Water quality impacts are not expected until more than 40 percent of the basal area is reduced from timber harvest (Siemion and others 2011). The watersheds in this project area have been analyzed to determine where staggering of timber harvest activities is needed to meet this goal.

In the Otter project, vegetation treatments would be spread out over a ten year period and considering that effects to water resources from vegetation activities last less than 5 years in Pennsylvania (Lynch and Corbett 1990), effects from basal area reduction would likely not be apparent in streamflow. With implementation of project design features, basal area reduction from timber harvest would not exceed 25 percent in the project area watersheds, and increases in streamflow (water quantity), or changes to water quality are not anticipated.

Shelterwood removal treatments were evaluated on 30 small watersheds within the project area to determine if basal area reduction would exceed 25 percent. These watershed areas ranged from 67 acres to 7,643 acres with the median size of 619 acres. The proposed action proposes final harvests (shelterwood seed cuts followed by shelterwood removal cuts) on 1442 acres, thinning to accelerate mature forest conditions on 69 acres and single tree/group selection on 68 acres. Of the 30 watersheds, 21 watersheds had even-aged treatments on more than 10 acres.

Analysis of project percent basal area reduction shows that five small watersheds would exceed 25 percent basal area reduction if all proposed treatments were implemented at the same time. These include an unnamed tributary (UNT3) of Big Mill Creek, an unnamed tributary of Bloody Run, Pine Run, Spencer Run, and Bunts Run. Watersheds that are of greatest concern are the unnamed tributary of Bloody Run and Pine Run. Both of these have proposals greater than 40 percent and have acidic conditions. By keeping the amount of vegetation in a 0 to 5 year age class below 25 percent of the watershed would avoid causing additional impairments to water quality. Activities occurring in the five identified watersheds will follow this design criteria to avoid impacts to water quality or quantity:

Water quality and quantity will also be protected by restricting commercial timber harvesting within riparian corridors or no-cut zones around wetlands. Additional Forest Plan guidelines that will help maintain water quality and water quantity include minimizing soil disturbance and restrictions on whole-tree harvesting, leaving slash on-site, and retaining large woody debris. The benefits of these guidelines were discussed in the soil section. The benefits of liming proposal are discussed below.

No Action

Basal area reductions would occur through previously approved activities and private oil and gas development. No water quality effects are anticipated as basal area reductions are less than the 25 percent threshold.

Herbicide Treatments

Proposed Action

Herbicide treatments are proposed on 1,585 acres (10.9 percent) of the project area for reforestation and 67 acres (0.5 percent) for non-native invasive plant species treatments, and they are expected to have no effect on water quality or water quantity. The majority of these treatments are located away from streams and wetlands and these resources would be protected through application guidelines, low application rates, and herbicide buffers identified in the Forest Plan (USDA-FS 2007a, pages 55–58). Where treatment of non-native invasive plants occurs, these herbicide treatments may be beneficial for establishment of native vegetation that promote infiltration and stabilize soils to protect against erosion. Manual and mechanical herbicide treatments are expected to have no effect on water quality and water quantity because dry or flowing streams, tributaries, water bodies, seeps, springs, and wetlands would be protected through buffers identified in the Forest Plan (USDA-FS 2007a, pages 55-58). These buffers would be applied to all Waters of the United States (and the Commonwealth) and they are designed to prevent herbicides from entering these waters and to protect aquatic resources and human health. These standards and guidelines are based on the Human Health Risk Assessment completed for the Forest Plan Final Environmental Impact Statement, Appendix G (USDA-FS 2007b). Appendix A of the Forest Plan (USDA-FS 2007a, pages A43-A45) contains additional information on site selection, herbicide selection, and application methods and rates. Four years of water testing on the Allegheny National Forest found no detectable levels of herbicide downstream from areas treated to achieve reforestation objectives (USDA-FS 1989, 1990, 2002, 2016).

Visual monitoring of herbicide damage to vegetation is conducted within these buffers. It does not appear any herbicides have entered water courses based on this vegetation monitoring, indicating that buffer widths are sufficient to prevent herbicides from entering any waterways (USDA-FS 2014, pages 185-191). The Forest

Plan Final Environmental Impact Statement discusses the effects of herbicides on water quality with the implementation of Forest Plan standards and guidelines, and its analysis on pages 3-33 and 3-35 is incorporated by reference. It finds that water quality will be maintained through water resource buffers, excluding treatment and/or equipment from buffer areas, and restricting application during wind and rain to avoid drift or runoff

No Action

None of the proposed herbicide treatments would occur.

Prescribed Fire

Proposed Action

The risk of adverse impacts to water quality from the prescribed fires is low. Prescribed fire would result in minimal, short-term effects to water quality and quantity because burns would be of low to moderate intensity and low to moderate severity fires, where vegetation usually returns very quickly after this disturbance (USDA-FS 2007a, page 3-41). Prescribed fire would consume ground cover, but temperatures would not be high enough to consume the organic layer of the soil or the roots, so erosion will be minimal. After intense precipitation that causes overland runoff, some movement of ash to nearby streams may occur. Low to moderate intensity fires can facilitate nutrient cycling and may increase soil pH, which may cause beneficial short term improvements to water quality.

An estimated 600 to 900 gallons of water per day over one day could be withdrawn to facilitate burning and mop-up of 16 acres of warm season grasses prescribed burning every 3 to 5 years. Implementation of Forest Plan guidelines would ensure that the drafting of water from a stream for this and other incidental uses would maintain existing uses such as fish and aquatic life (USDA-FS 2007a, page 76). This volume is minimal considering a small stream in this project area may flow one million gallons per day in the summer.

No Action

None of the proposed prescribed fire treatments would occur. No benefits to streams would occur from the nutrient cycling and pH increase in soils caused by fires.

Large Wood Introductions

Proposed Action

The proposed action proposes to fell up to 170 trees (large wood introductions) per mile into streams and onto floodplains to improve aquatic habitat diversity, trap sediment, and slow flood flows. This is proposed for 30.2 miles of streams but would occur only where large woody debris is lacking and where trees are available to be felled without reducing stream shading. The addition of large wood to streams helps create quality pools, slow flood flows, and store sediment and organic debris. The improvements are important for aquatic organism survival and propagation. This riparian improvement prescription was analyzed in the 2007 Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, pages 3-29 to 3-31, 3-40 to 3-41, 3-47). Streams were surveyed in this project area and were found to have insufficient quality pools and large wood for providing quality stream habitat. Based on these aquatic habitat inventories and expected needs in streams, it is anticipated that up to 170 trees per mile would need to be added into streams to meet aquatic habitat goals.

Restoration work is proposed on Big Mill Creek that would involve the placement of trees and rootwads using excavators. The large wood projects would temporarily disturb soils during installation of large wood structures. Soils would be uncompacted on access trails and are expected to restore quickly. These large wood projects would have beneficial effects on the aquatic habitat by improving channel diversity.

Large wood in the streams would also help disperse flood flows out onto the floodplains, which in turn would allow for infiltration and increased base flows in the summer.

Restoration of large wood levels would, in the short and long term, directly benefit juvenile and adult fish by creating larger lateral pools for rearing and resting and additional side channel over-wintering habitat. Montgomery and others (1995) documented that as the frequency of large wood increased within stream channels, both pool frequency and depth increased. In addition to increased pool frequency and depth, restoration of large wood levels benefits adult and juvenile trout by increasing hiding cover and retention of other organics (Cedarholm and others 2000). Large wood restoration would also provide roughness elements that would help regulate bed load movement of the stream channel and fine sediment deposition on the flood plain through time. Log complexes would also assist in the regulation of water velocity and infiltration of water on floodplains.

No Action

Without the addition of large wood, stream improvements and their associated benefits would take substantially longer. Full recovery could take as long as 50 years in streams where riparian stands are in good condition and would require even more time in areas where conditions are poor.

Forest Liming

Proposed Action

The proposed action proposes to lime 272 acres in six watersheds where it would be beneficial to soil and water resources and in the long-term benefiting the aquatic resources. The lime would help neutralize the acidity within soil pore water and increase pH and alkalinity of soil stormwater runoff, surficial groundwater, and waterways.

No Action

None of the proposed forest liming treatments would occur. No benefits to streams would occur from neutralizing of acidity within soil pore water or pH and alkalinity increase from soil stormwater runoff, surficial groundwater, and waterways. Water resources in the project area would continue to be susceptible to impaired water quality due to acid deposition and the loss of base cations in soil resources.

Cumulative Effects on Water Quality and Water Quantity

Approved activities in the water resources cumulative effects area include shelterwood treatments that were approved in the East Side Final Environmental Impact Statement, FY07 Regeneration Environmental Assessment, and the Aspen Regeneration Categorical Exclusion. Suppression treatments of hemlock wooly adelgid have also been approved in the Big Mill Creek subwatershed. Eastern hemlock is important for sustaining water quality and quantity and treatments approved to suppress the adelgid will help to preserve hemlock in this watershed. The Marienville Buckthorn Treatment EA could treat 500 to 1000 acres of Buckthorn in the project area. This will be beneficial to native plants and trees, which are critical for maintaining water quality and quantity.

The Brush Hollow Environmental Assessment was approved in 2008 in the headwaters of Big Mill Creek and Pine Bear Environmental Assessment was approved in 2009 in the headwaters of Bear Creek. These projects were not considered in the analysis because they will not add to water quality or water quantity effects since these projects did not propose treatments that would remove more than 25 percent basal area in a watershed.

The non-federal lands within the cumulative effects watershed boundary include 2,454 acres of both industrial and non-industrial private lands (23 percent of the cumulative effects analysis area). Using harvest projections for private industrial and non-industrial lands from the ANF Forest Plan FEIS

(USDA-FS 2007b, Table 3-42, p. 3-177), projected estimates were made for non-federal lands in the cumulative effects analysis area.

Based on the implementation of on-going timber harvest activities in combination with approved and reasonably foreseeable Forest Service and private activities, cumulative effects to water quality and water quantity within the project and cumulative effects analysis areas are expected to be minimal. This conclusion is supported by the following: (1) proposed activities will comply with Forest Plan standards and guidelines and are designed to minimize effects to water resources and water quality (USDA-FS 2007a); and Forest Plan standards and guides meet or exceed Pennsylvania best management practices; (2) treatments would be spread across the landscape and be done over time; (3) the Forest Service analyzes all projects to ensure the basal area reductions from commercial timber harvests affects less than 25 percent of a watershed; (4) the majority of treatments are located away from streams and wetlands; (5) proposed road improvements in the project area will reduce erosion and sedimentation; and (6) private oil and gas would be regulated by Pennsylvania Department of Environmental Protection to reduce effects to water resources.

Road Construction, Maintenance, and Decommissioning within 300 Feet of Streams

Proposed Action

Overall, transportation activities approved in this project are expected to reduce the hydrologic connectivity of the road network to streams through maintenance in the proposed action on 14.3 miles of Forest Roads within 300 feet of streams. When the stormwater connection is diverted, the effect of storm water runoff and sedimentation on streams is decreased. These activities should have a beneficial effect on water quantity in the cumulative effects analysis area. The 1.2 miles of new road construction and 0.4 miles of road realignment in the proposed action would cause changes to soil compaction and locally change infiltration rates. The roads would be designed to increase stormwater infiltration along the road by frequently diverting road runoff into infiltration areas. Changes in streamflow in stream flow and impacts to groundwater are not expected since the road is located more than 300 feet from streams.

Based on the implementation of road construction activities in the proposed action, in combination with approved and future Forest Service and private activities, cumulative effects to water quality and quantity within the project area from road construction are expected to be minimal. Some of the effects of the road maintenance is expected to be positive from the reduction in sediment and runoff to streams. There may be some improvement in water quality and quantity where proposed road activities reduce the hydrologic connectivity of the road network to streams. Runoff and sedimentation concerns would be mitigated through implementation of forest plan standards and guidelines and best management practices. The road decommissioning of 5.8 miles within 300 feet of streams is expected to have beneficial effects by increasing infiltration and decreasing runoff. The other projects identified within the cumulative effects boundary are not expected to have any road work completed other than maintenance within 300 feet of streams.

Private timber activities in cumulative effects analysis area drainages are expected within the next 20 years and may add to current negative impacts on water quality where new roads are constructed near stream channels. Pennsylvania best management practices for road construction would reduce effects to water resources (PADEP 2005).

Private oil and gas development on Allegheny National Forest and private lands has constructed roads within 300 feet of streams within the cumulative effects analysis area. Over the next 20 years, additional roads may be constructed on Allegheny National Forest and private lands in the cumulative effects analysis area. Pennsylvania best management practices set guidelines for road and well pad construction

for oil and gas developers to control erosion, sedimentation, and impacts to streamflow regimes. Protection of water resources would be accomplished by providing buffers from streams and wetlands and controlling erosion and runoff from roads, particularly at stream crossings. Although these conservation measures are effective at reducing effects, sediment and increased runoff could reach streams and wetlands wherever they are crossed. Sedimentation would be the greatest during construction and would lessen once areas are stabilized.

All road activities would be required to maintain or improve the water quality standards of the streams in the project area through the Pennsylvania Department of Environmental Protection antidegradation requirement (PADEP 2016b).

No Action

For the no action alternative, there are no new proposed activities. Water quality and water quantity are expected to be maintained. Road maintenance would reduce sedimentation and runoff over the long term. Routine road maintenance would improve water quality and impacts to the stream flow regime by decreasing runoff into streams (Scheetz and Bloser 2008). Roads not receiving maintenance may continue to contribute sediment and increase runoff into streams. There would be minimal improvements to existing Allegheny National Forest roads and non-system roads.

The effects of private timber activities and private oil and gas would be the same as the proposed action.

Basal Area Reduction

Table 12 shows basal area reductions for all activities in the project area by alternative based on watershed impacts. These basal area reductions include oil and gas development, private lands, and forest road clearing.

Proposed Action

In the proposed action, most of the forest harvest activities would be in the Bear Creek and Big Mill Creek subwatersheds and would cause a basal area reduction of 12.5 percent on National Forest System lands. Basal area would be reduced by an additional 1.6 percent by the implementation of previously approved treatments in the East Side and FY07 Regeneration projects. Vegetation treatments would occur over about a 20-year period throughout project area watersheds. Some of the removal treatments would occur earlier in the 20-year period than other removal cuts due to the condition of the regeneration, which would separate the timing of the basal area reduction by at least 5 years.

Projecting that private land harvesting would be similar to the Forest Plan predictions, basal area reduction would be about 515 acres (3.6 percent of the project area) on private land over the next two decades.

Treatments on private and National Forest System lands would reduce basal area by no more than 15.3 percent in the cumulative effects watershed if all treatments were implemented in the same year. This is well below the 25 percent basal area reduction goal to avoid impacts to water quality and water quantity. Given that these treatments would be spread out over a 10 year period and considering that effects to water resources from vegetation activities last less than five years in Pennsylvania (Lynch and Corbett 1990), effects from basal area reduction would not be likely to increase stream flows.

Analysis of project percent basal area reduction shows that the following five small watershed would exceed 25 percent basal area reduction if all Forest Service treatments and private land treatments were implemented at the same time. These include unnamed tributary (UNT3) of Big Mill Creek, unnamed tributary of Bloody Run, Pine Run, Spencer Run, and Bunts Run.

GIS data indicate at least 60 private oil and gas wells exist in the cumulative effects analysis area. Using Forest Plan Final Environmental Impact Statement assumptions to project future private oil and gas development, no new wells are expected to be drilled on the cumulative effects analysis area (includes private and state land) in the next two decades due to many shallow wells in this area being plugged. One deep shale gas well is expected to be developed. Total acreage affected by existing and anticipated private oil and gas development (70 acres), including road construction, is approximately 0.5 percent of the cumulative effects analysis area over the next twenty years. This construction will increase basal area reduction in the cumulative effects watershed analysis area to 15.8 percent. This is below the 25 percent basal area reduction goal to avoid impacts to water quality or water quantity.

No Action

In the no action alternative, basal area reductions would occur only through natural processes, previously approved projects, harvesting on private lands, or oil and gas development. With the exception of oil and gas development, the amount of forested areas in a 0 to 5 age class would continue to decrease and water quantity and quality would remain constant. Basal area reductions for the no action alternative range from 3.6 to 5.3 percent depending on the amount of private timber harvest and oil and gas development that occurs.

Table 12–Cumulative effects of implementation of project alternatives in the portions of the Bear Creek, Big Mill Creek, and Little Mill Creek subwatersheds within the project boundary.

Proposed Action – Water Quality/ Water Quantity	Acres	Basal area reduction (Percent)
Timber stands in 0 to 5 age class	37	0.3
Previously approved shelterwood harvests (East Side, FY07 Regeneration)	192	1.3
Basal area reduction proposed in Otter	1501	10.3
New road construction proposed in Otter	6	0
Total Forest Service Activity	1736	12.0
Private oil and gas clearing–existing condition	60	0.41
Private oil and gas clearing 2019–2039	10	0.07
Private land–final harvests	515	3.6
Total basal area reduction in 2029	2285	15.8
Total basal area reduction in 2029–No oil and gas development	2215	15.3
Total basal area reduction in 2039. All even aged treatments implemented by 2034. Streamflow effects are dissipated	592	4.1
Total Basal Area Reduction in 2039. All even aged treatments implemented by 2034. Streamflow effects are dissipated. No oil and gas development	522	3.6

No Action – Water Quality/ Water Quantity	Acres	Basal area reduction (Percent)
Timber stands in 0 to 5 age class	37	0.3
Previously approved shelterwood harvests (East Side, FY07 Regeneration)	192	1.3
Upcoming sales	0	0
Private oil and gas clearing–existing condition	60	0.4
Private oil and gas clearing 2019-2039	0	0
Private land–final harvests	515	3.6
Maximum basal area reduction with oil and gas	767	5.3
Total basal area reduction in 2039. All previously approved even aged treatments implemented by 2033. Streamflow effects are dissipated	707	4.9
Total Basal Area Reduction in 2039-All previously approved even aged treatments implemented by 2033- Streamflow effects are dissipated- No oil and gas development.	575	4.0

Herbicide Treatments

Cumulative effects on water quality from herbicide treatments are not expected in either alternative. In the proposed action, herbicide applications are proposed on 13.8 percent (up to 1,652 acres) of the project cumulative effects area. The majority of these treatments are located away from streams and wetlands. Streams and wetlands will be protected through application guidelines, low application rates, and herbicide buffers identified in the Forest Plan (USDA-FS 2007a, pages 55–58). The Marienville Buckthorn Treatment Environmental Assessment could treat 500 to 1000 acres of Buckthorn in the project area. Buckthorn can outcompete native vegetation in riparian areas and around wetlands, so this will be beneficial to native plants and trees, which are critical for maintaining water quality and quantity.

Prescribed Fire

Cumulative effects from prescribe fire are not expected in either alternative because the risk of adverse impacts to water quality or water quantity from prescribed fires is low. Prescribed fire would result in minimal, short-term effects to water quality and quantity because burns would be of low to moderate intensity and low to moderate severity fires, where vegetation usually returns very quickly after this disturbance (USDA-FS 2007a, page 3-41). Low to moderate intensity fires can facilitate nutrient cycling and may increase soil pH, which may cause beneficial short term improvements to water quality. Water use during prescribed fire is small and would not affect water quantity.

Large Wood Introductions

Cumulative effects from large wood introductions to streams would be greatest in the proposed action. There will be beneficial impacts to water quality or water quantity from the addition of large wood to streams in the project area. The addition of large wood to streams helps create quality pools, slow flood flows, and store sediment and organic debris. The improvements are important for aquatic organism survival and propagation. These benefits to streams could take as long as 50 years to occur in the no action alternative

Water Withdrawal Related to Oil and Gas Activity

Water quantity impacts within the project area are not expected from private mineral rights using ground water or surface water. Specific data regarding the number of future wells that may be developed, their water requirements for hydraulic fracturing, and the sources of water that would be used for hydraulic fracturing are not available. Therefore, the impacts of private oil and gas development on water quantity may only be discussed in general terms.

The water used for hydraulic fracturing is typically hauled in from a Pennsylvania Department of Environmental Protection approved surface or groundwater withdrawal site. Surface water withdrawal for hydraulic fracturing is also a possibility and could potentially be withdrawn from major streams if it is permitted through the Pennsylvania Department of Environmental Protection.

Marcellus shale well pads may use 3 to 5 million gallons of water (Kuzma and Gleason 2009, personal communication). Marcellus shale well developers are required to submit water management plans to the Pennsylvania Department of Environmental Protection whether the water is withdrawn from local sources or hauled in. The Pennsylvania Department of Environmental Protection reviews these plans for individual and cumulative impacts and will not approve plans unless sufficient water remains to maintain existing and designated uses.

Summary of Environmental Effects

Implementation of Forest Service activities would be consistent with State and Federal laws and Forest Service regulations and handbooks. Forest Plan standards and guidelines and application of Pennsylvania best management practices during project implementation would ensure that effects from the project would have no adverse effects to water resources.

Road maintenance is likely to occur at a faster rate under the proposed action as compared to the no action alternative, because funds would be generated from timber sales to improve road condition. Therefore, there would be a greater reduction in sedimentation and runoff. New road construction is not expected to impact streams or wetlands because the roads have been laid out away from these resources.

The proposed activities and the previously approved activities are not anticipated to cause measurable changes to water quantity of streams or ground water. Given the sequence of the shelterwood and overstory treatments and the staggering of implementing treatments, basal area reduction would not exceed 25 percent. Even if the 25 percent value were exceeded slightly, streamflows would increase slightly during the low flow seasons, which may be beneficial to water quantity. By minimizing the impacts to streamflow from timber harvest, water quality of streams would be maintained. Water quality impacts are not expected until more than 40 percent of the basal area is reduced from timber harvest. Analysis of project percent basal area reduction shows that five small watershed will exceed 25 percent basal area reduction if all Forest Service treatments were implemented at the same time. The following watersheds will require district coordination to ensure that treatments are staggered so that 25 basal area reduction is not caused: unnamed tributary (UNT3) of Big Mill Creek, unnamed tributary of Bloody Run, Pine Run, Spencer Run, and Bunts Run.

The proposed felling of 170 trees per mile added to the streams within the project area would help disperse high flows onto floodplains, create pools and cover, and trap debris and sediment, which is beneficial to aquatic organisms.

The application of lime on some forested stands is expected to be beneficial to water quality in these small watersheds by increasing the amount of buffering of rain water that occurs.

Project design features, Forest Plan standards and guidelines, and Pennsylvania best management practices are expected to maintain or improve water quality and quantity in this project. All activities would be required to maintain or improve the water quality standards of the streams in the project area through the Pennsylvania Department of Environmental Protection's anti-degradation requirement (PADEP 2016b).

Air Quality

Analysis Framework

The Clean Air Act, last amended in 1990, requires the U.S. Environmental Protection Agency to set National Ambient Air Quality Standards for six common air pollutants (USEPA 2016). These “criteria pollutants” are commonly found and can be hazardous to human health, the environment, and can potentially cause property damage. The Environmental Protection Agency regulates these six pollutants by setting scientifically-based permissible levels. The six criteria pollutants identified by the Environmental Protection Agency are: ground-level ozone (O₃), sulfur dioxide (SO₂), carbon monoxide (CO), nitrogen dioxide (NO₂), particulate matter (PM_{2.5, 10}), and lead (Pb).

Monitoring of the National Ambient Air Quality Standards generally occurs at the state level and is enforced through Environmental Protection Agency approved state implementation plans. The plans typically include a collection of monitoring devices throughout the state which provide actual measurements of the concentrations in the air and identify whether an area is meeting the air quality standards. Areas which meet the standards are considered in “attainment” status, while those that do not meet the standards are considered in “nonattainment” status. States with nonattainment areas must implement strategies which will reduce emissions. This report uses the most current information available from Environmental Protection Agency websites which post values from monitoring stations, which are generally located in urbanized or industrial areas. The one exception to this urban/industrial placement of state level monitors is a long-term O₃ monitoring station located in the Kane Experimental Forest in Elk County, Pennsylvania. The Kane Experimental Forest O₃ monitoring station is approved for regulatory monitoring (USEPA 2018a). Urbanized or industrial areas are assumed to be an overstatement of expected values on the Allegheny National Forest based on the knowledge that the combined Allegheny National Forest four-county population estimate for 2017 (120,584 total; Elk County – 30,781; Forest County – 7,388; McKean County – 42,070; Warren County – 40,345) is less than half the 2017 population estimate of Erie County (277,794) (USDOC 2018). The nearest Environmental Protection Agency approved monitoring stations for CO, NO₂ and PM_{2.5, 10} are located in Erie, Pennsylvania. There is an Environmental Protection Agency approved monitor for SO₂ located in the city of Warren, Pennsylvania. The nearest monitor for lead is located in Beaver County (USEPA 2019).

Currently, the four-county area of Pennsylvania, in which the Allegheny National Forest is located, is in attainment of all the National Ambient Air Quality Standards except SO₂ (USEPA 2019) (see Table 13). Effective October 4, 2013, an area consisting of Conewango Township, Glade Township, Pleasant Township, and the City of Warren were designated as a nonattainment area for pollutant SO₂ (USGPO 2013). A portion of the newly designated SO₂ nonattainment area, in the vicinity of the City of Warren, is within the proclamation boundary of the Allegheny National Forest; however, nothing proposed in the Otter project is within the nonattainment area.

Environmental Consequences

Indicator Measure 8: Effects of proposed activities on the attainment of National Ambient Air Quality Standards

Proposed Action and No Action

Proposed activities that generate emissions include: operation of engines used to perform silvicultural treatments and prescribed fires. Under the no action alternative, there would be no newly proposed prescribed fires or silvicultural activities on National Forest System lands in this project area.

The proposed action would implement the treatments proposed, including silvicultural activities and prescribed burning. For timber harvest, there are 15,782 CCF (100 cubic feet) of timber proposed to be harvested in the first entry (approximately 2020), 24,943 CCF is proposed to be harvested in the second entry (approximately 2030). The greatest amount of acres that could be prescribed burned in one year, for the proposed action, would be up to 16 acres of warm season grasses per year.

The amount of pollutants added to the atmosphere by dispersed proposed activities listed above is not expected to exceed the National Ambient Air Quality Standards for the five criteria pollutants in attainment, nor are these activities expected to have any effect on the SO₂ nonattainment area in the vicinity of the City of Warren. The impact of each activity on air quality is quickly diffused due to the amounts projected over time and space within the project area. Small sized prescribed fires are short lived, and last only a matter of hours. Burn plans would address general concerns with prescribed fires, such as reduction in visibility or to inhalation of fine particulates. Mitigations will be employed in smoke sensitive areas to avoid concentrating smoke in population concentrated areas.

Additionally, ozone is a pollutant which is measured at the Kane Experimental Forest. The three year average annual ozone concentration at Kane Experimental Forest for the fourth highest 8-hour daily maximum, as reported by EPA for attainment designation, at the Kane Experimental Forest monitoring station from 2016 to 2018, was 0.065 parts per million (ppm) (USEPA 2018a), which is below the National Ambient Air Quality Standards. Further discussion on ozone monitoring can be found in the most recent Allegheny National Forest Monitoring and Evaluation Report (USDA-FS 2014).

Table 13–National Ambient Air Quality Standard criteria pollutant attainment status

Criteria Pollutant	Averaging Time	Level	Attainment (USEPA 2019)
O ₃	8 hour	0.070 ppm	Yes
SO ₂	1 hour	75 ppb	No ¹
CO	8 hour	9 ppm	Yes
NO ₂	1 hour	100 ppb	Yes
PM ₁₀	24 hour	150 µg/m ³	Yes
PM _{2.5}	Annual	12 µg/m ³	Yes
Pb	3 month average	0.15 µg/m ³	Yes

¹ None of the Otter project area is within the SO₂ non-attainment area of Warren, Glade, Conewango, or Pleasant Townships.

Cumulative Effects

The largest emissions of O₃ precursors NO_x, and volatile organic compounds (VOC), as well as CO, under the no action alternative, are due to private, shallow, traditional oil and gas development (Table 14). Private oil and gas development emissions include the equipment from the normal maintenance of operating shallow traditional wells.

The largest emissions of O₃ precursors NO_x, and VOC, as well as CO, under the proposed action alternative, in 2028, are due to timber harvesting operations. While 2030 is the proposed year for the

second timber harvest entry, as part of this air quality analysis, the 2030 timber harvesting emission estimates were moved to 2028, as 2030 emission estimates are not available for the four county Allegheny National Forest area (Table 14). It is not expected that the emissions from the proposed activities would have an effect on the continued attainment for O₃ or CO in the project area.

Particulate matter emissions under the no action alternative are less than one ton per year for all activities listed in this analysis (Prescribed burning, timber harvesting, and oil and gas development emissions). The largest particulate matter emissions under the proposed action are from timber harvesting and the level shown in Table 14 is expected to only occur in one year. Expected particulate matter emissions due to the proposed action are not expected to have an effect on the continued attainment status for particulate matter in the project area.

SO₂ levels in the project area are expected to continue to decrease with increased pollution controls on major emission sources, and with the implementation of a new Pennsylvania low sulfur fuel oil limit (USGPO 2014). Emissions from non-road engines, as part of the proposed action, are not expected to have an effect on the ambient level of SO₂ in the project area.

Lead is not discussed in this report because none of the proposed activities will contribute to air quality emissions for this pollutant. In Pennsylvania, only portions of Beaver and Berks counties are considered to be in nonattainment for lead as part of Environmental Protection Agency designations in November 2011 (US EPA 2019).

The cumulative effect of past, present and reasonably foreseeable future federal and non-federal actions are not expected to bring any of the criteria air pollutants currently in attainment to levels that exceed the National Ambient Air Quality Standards, nor are these actions expected to have any noticeable effect on ambient SO₂ levels.

Table 14–Estimated emissions for prescribed fire, timber harvest, and private shallow traditional oil and gas development for the project area compared to the four county area

Pollutant		Prescribed fire emissions (Tons/Year)		Timber harvest emissions (Tons/Year)		Oil and gas development emissions (Tons/Year)	
		2019	2028	2019	2028	2019	2028
No Action	VOC	0	0	0	0	1	1
	PM	0	0	0	0	0	0
	NO _x	0	0	0	0	7	7
	CO	0	0	0	0	15	15
Proposed Action	VOC	0	0	0	10	1	1
	PM	0	1	0	2	0	0
	NO _x	0	0	0	33	7	7
	CO	0	5	0	96	15	15

Pollutant		Allegheny National Forest Emissions (Tons/Year)		Four-county emissions (Tons/Year)		Percent Allegheny National Forest Management of Four County Emissions	
		2019	2028	2019	2028	2019	2028
No Action	VOC	1	1	7,923	11,372	0.01	0.01
	PM	0	0	4,363	2,775	0.00	0.00
	NO _x	7	7	9,812	15,254	0.07	0.05
	CO	15	15	44,337	36,005	0.03	0.04
Proposed Action	VOC	1	11	7,923	11,372	0.01	0.10
	PM	0	3	4,363	2,775	0.00	0.11
	NO _x	7	40	9,812	15,254	0.07	0.26
	CO	15	116	44,337	36,005	0.03	0.32

Note: Emission estimates for 2019 are based on VISTA Emission Tool (USDA-FS 2005b) for the four county area, which do not go out to 2028. Emission estimates for 2028 are based on the Technical Support Document completed by Mid-Atlantic Regional Air Management Association, Inc. and SRA International, Inc. (McDill, McCusker, and Sabo 2015) for the four county area. Current year (2019), and 2028 are listed here, with 2030 timber harvesting emissions listed in 2028 to compare those emissions with available future four county emissions.

In the project area, there are no currently existing Marcellus well pads. Based on current development of Marcellus well pads in the area, it is expected that one additional Marcellus well pad will be developed in the proposed project activity period. In the one Marcellus well listed in the Pennsylvania Department of Environmental Protection Bureau of Air Quality Power BI Report Server, for Ridgway, Elk County, Pennsylvania, near the southeast boundary of the Otter project area, which quantified emissions for the four pollutants listed in Table 14, completion and drill rig emissions are listed as 13 tons of CO, 10 tons, of NO_x, 2 tons of VOC, and less than 1 ton of PM (PADEP 2019). These emissions are listed as occurring in 2013. This was the only completion/drill rig listing for the 2012–2017 period for Ridgway. It is unknown if this will be representative of a possible future Marcellus well in the project area.

The Pennsylvania Department of Environmental Protection completed three Marcellus Shale Short-Term Ambient Air Sampling Reports. These reports were completed for Southwestern Pennsylvania (PADEP 2010), Northcentral Pennsylvania (PADEP 2011a), and Northeastern Pennsylvania (PADEP 2011b). None of the short-term ambient air sampling detected levels of CO, NO₂, or O₃ above the NAAQS levels at any of the sampling sites. The northcentral and northeastern sites also sampled SO₂, and neither site detected concentrations above National Ambient Air Quality Standards levels. The studies did not review potential cumulative emissions from development of Marcellus gas and oil plays.

A project by the US Department of Energy, National Energy Technology Lab, conducted targeted on-site measurements of air emissions from oil and natural gas exploration and production activities that may impact the Allegheny National Forest environment (Pekney and others 2014). While National Energy Technology Lab was not completing compliance monitoring, National Energy Technology Lab was using calibrated Environmental Protection Agency federal reference method instruments. Although it would not be appropriate to compare the National Energy Technology Lab results to the National Ambient Air Quality Standards, the National Energy Technology Lab did not record any data that could have been considered a National Ambient Air Quality Standards standard exceedance. One of the results from the project is that the authors believe their data could be used as a baseline to document any potential impacts from future well development.

New standards for the oil and natural gas sector were published in the Federal Register on June 3, 2016 (US GPO 2016). The measures finalized by these standards predict expected emissions reductions from certain new, modified, or reconstructed equipment, processes, and activities across the oil and natural gas sector. This includes hydraulically fractured oil and gas well completions and associated processing and transporting, inclusive of specified equipment used to transport and process oil and natural gas. These new standards are expected to result in significant reduction in emissions (US GPO 2016).

It is not expected that the Marcellus well activity in the project area will create an exceedance for any of the National Ambient Air Quality Standards that are in attainment, nor have a noticeable effect on the ambient SO₂ levels.

Heritage Resources

Analysis Framework

Prior to the field survey associated with this project, 45 heritage resources had been inventoried within 500 meters of the project boundary. The site types span a range of time periods and cultural associations, and include prehistoric sites, historic logging camps, railroad grades, and oil and gas development sites.

Field surveys for this project identified 23 new sites including 10 oil and gas extraction and historic roadside bottle dumps that are being recommended as ***not eligible*** for listing on the National Register of Historic Places as they do not meet any of the criteria of eligibility. Additionally, a previously identified railroad grade will be recommended as ***not eligible*** for listing on the National Register of Historic Places.

Environmental Consequences

Indicator Measure 9: Effects to heritage resources

Proposed Action and No Action

Eligible and unevaluated heritage resources for listing on the National Register of Historic Places will be protected by following the compliance process mandated by Section 106 of the National Historic Preservation Act and recommendations outlined in the cultural resource report for the Otter project. The regulations governing Section 106 review are contained in 36 CFR Part 800, which describes the compliance process. All eligible and unevaluated sites will be protected by avoidance or other site-specific mitigations identified by the forest heritage program manager or district archaeologist; and therefore, there would be no effects to heritage resources from the proposed action or no action alternatives.

Recreation Opportunities and Forest Settings

Recreation Opportunities

The recreation analysis is based upon two primary indicators for measuring effects: (1) whether the activities in each alternative would be consistent with the recreation opportunity spectrum settings, and (2) whether the activities proposed in each alternative would alter existing recreation activities and their use patterns within the project area.

Recreation Opportunity Spectrum (ROS) Setting

The recreation opportunity spectrum is a system for planning and managing recreational settings by distinguishing the varying conditions and qualities in the landscape. This distinction helps land

managers to provide a diverse range of opportunities and experiences to recreationists. The following indicators help to determine recreation opportunity spectrum settings: (1) access, (2) site management, (3) visitor management, (4) social encounters, and (5) visitor impacts.

Using the above-listed indicators, recreational settings are arranged along a continuum of six recreation opportunity spectrum classes, progressing from least to greatest development: primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban (USDA-FS 2007b, pages C-3 and C-4). On the Allegheny National Forest, recreation opportunity spectrum classes range from semi-primitive non-motorized to rural (USDA-FS 2007b, page C-2). The Otter project area is located in roaded natural (Management Areas 2.2 and 3.0) on the recreation opportunity spectrum (ROS) settings.

Recreation Activities and Use Patterns

The Otter project area lacks developed recreation sites, motorized trails, and hiking trails, but is popular for dispersed camping, fishing, and hunting.

Table 15—Otter project area existing recreation activities and use patterns.

Recreation Activity	Use Patterns
Dispersed Camping	Within the project area, there are 5 roadside dispersed camping sites on forest road 135, 15 sites on forest road 143, 3 sites on forest road 237, 1 site on forest road 297, and 6 sites on forest road 860 in the area of the old Red Mill Campground. Some of these sites are heavily used, with typical human-caused impacts such as barren, muddy ground, tire ruts, damaged trees, large fire rings with abundant charcoal, and occasional litter. A few sites are seldom, if ever, used since they were first inventoried and are returning to a natural state. Sites are examined during project area analysis for site suitability and sustainability. Sites that are considered unsuitable for the location are closed; sites that are sustainable may need some rehabilitation work to improve user conditions.
Unroaded Areas	The forest-wide roads analysis completed in 2003 identified 31 unroaded areas. Unroaded areas are defined as being more than 0.25-mile from an existing classified road and of a size greater than 500 acres. There are two identified unroaded areas over 500 acres in size in the project area: #29 – Rocky Run (1,005 acres) and #56 – Bloody Run (599 acres).
Hunting and Fishing	Hunting occurs throughout the project area and is highest in late November and early December. Parking is available along forest roads, and some campsites see continued use into the hunting season. While not all the roads are open during hunting season, the main roads through the project area are open and hunters are welcome to walk behind gates in search of game. The increase of glossy buckthorn in the project area is becoming more of an issue for hunters as it impedes their ability to move through the forest, can hide features used for wayfinding, and does not provide desirable game habitat conditions. Unroaded areas (greater than 500 acres) offer more of a challenge in accessing and

Recreation Activity	Use Patterns
	<p>retrieving game and a perception that larger game animals will be found in these areas as opposed to more readily accessible stands.</p> <p>Fishing opportunities occur in Big Mill Creek, Bloody Run, Bunts Run, Otter Run, Pine Run, Red Mill Run, Rocky Run, and Spencer Run. Smaller tributaries of these streams also occur in the project area and may be fished if the water levels are high enough to support a fishery. Stocked trout streams are heavily utilized during the first few weeks of trout season.</p>
High Recreation Use Corridors	<p>State route 948 is the only Concern Level 1 travel way near the project, providing the northern and most of the eastern boundary of the area, with significant amounts of private land along this corridor. Forest roads 143, 237, and 339 are Concern Level 2 travel ways bisecting or framing the project area. The site of the old Red Mill Campground near the ponds on Big Mill Creek is a Concern Level 2 area and Big Mill Creek is a Concern Level 2 waterway. Scenic Integrity is generally low to moderate throughout much of the project area, with a core of high in the area around the Bloody Run unroaded area; however, recent insect and disease infestations are changing the appearance of the forest. Scenic Attractiveness is generally considered "Common".</p>
Unique Features and Special Events	<p>There are no unique features or special events held within the project area.</p>

Forest Settings: Scenic Resources

Two primary indicators are used to measure effects to scenic resources: (1) changes to the existing landscape character of the project area, and (2) whether the project area and alternative meet the specified Forest Plan scenic integrity level.

Landscape character and Scenic Integrity Levels

Landscape character combines the physical, biological, and cultural attributes that makes each landscape identifiable or unique. The landscape character includes the landform, surface water, vegetation, land use patterns, and cultural features of the forest. Vegetation of the project area primarily consists of Allegheny, upland, and northern hardwoods on the plateau tops, with red maple, sugar maple, beech, white ash, black cherry, and yellow poplar mixed with eastern hemlock and white pine. The topography is made up of forested plateaus bisected by small drainages, streams, and spring seeps. Oil and gas wells and utility rights-of-way are found in the project area.

Scenic integrity levels are determined by analyzing four components:

Concern Levels: Concern levels measure forest visitors' concern for the scenic quality of the national forest and are determined using locations where visitors are most likely to view the environment, such as travel routes (roads and trails), concentrated use areas (vistas), or water bodies (streams and Allegheny Reservoir). Concern levels may be classified as: Concern Level 1, high sensitivity; Concern Level 2, average sensitivity, and Concern Level 3, low sensitivity. Allegheny National Forest concern level inventory can be found in the Forest Plan Final Environmental Impact Statement (USDA- FS 2007b, Table 49, pages B-62B-69). The project area concern level view facilities are

listed in Table 16. State Route 948 is the only Concern Level 1 travel way near the project, providing the northern and most of the eastern boundary of the area, with significant amounts of private land along this corridor. Forest roads 143, 237, and 339 are Concern Level 2 travel ways bisecting or framing the project area. The site of the old Red Mill Campground near the ponds on Big Mill Creek is a Concern Level 2 area and Big Mill Creek is a Concern Level 2 waterway.

Scenic Attractiveness: Scenic attractiveness is assigned according to the “scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, water characteristics, vegetation pattern, and cultural land use” (USDA-FS 1995, page 4-14). Scenic attractiveness may be classified as Variety Class A: Distinctive; Variety Class B: Typical; or Variety Class C: Indistinctive. Allegheny National Forest scenic attractiveness levels are mapped and stored in the Forest Supervisor’s GIS Library. Most of the project area is mapped as Variety Class B. The area situated nearest the Concern Level 1 area (State Route 948) is mapped as Variety Class A.

Scenic Classes: Scenic classes are units of measure defining scenic integrity levels, becoming scenic integrity objectives when adopted. Scenic classes measure the relative importance, or value, of discrete landscape areas having similar characteristics of scenic attractiveness and landscape visibility. The higher the scenic class, the more important it is to maintain the highest scenic value (USDA-FS 1995, page 4-14). Scenic classes are mapped and are also stored in the Forest Supervisor’s GIS Library. The majority of the project area is mapped as Scenic Class 2, with areas situated near Concern Level 1 areas mapped as Scenic Class 1.

Management Areas: Management areas are spatially identified areas within the Allegheny National Forest that link certain areas with applicable Forest Plan direction (standards and guidelines). Management areas are also mapped and are stored in the Forest Supervisor’s GIS Library. Management areas within this project area include 2.2 and 3.0.

Scenic integrity levels under the Scenery Management System define the different levels of acceptable alteration to scenic resources. These objectives range from very high (unaltered) to very low (heavily altered), and are based on views from the priority view facility. The Forest Plan management allocations for scenic integrity levels are assigned values of very high, high, moderate, low, very low, and unacceptable. The combined values from concern level, scenic attractiveness, scenic class, and management area result in a prescribed scenic integrity level or management goal for the prescription area. A scenic integrity level of very high has the most stringent visual restrictions, and a scenic integrity level of very low has the least stringent. The table below describes the scenic integrity levels found within the project area. Scenic Integrity is generally low to moderate throughout much of the project area, with a core of high in the area around the Bloody Run unroaded area; however, recent insect and disease infestations are changing the appearance of the forest. Scenic Attractiveness is generally considered “Common”.

Table 16—Existing scenic integrity level conditions

Scenic Integrity	Existing Condition	View Facility
High Scenic Integrity	Appears unaltered: The valued landscape character appears intact. Deviations may be present, but are not evident because they repeat the form, line, color, texture, and pattern common to the landscape character so completely and at the appropriate scale.	Concern Level 1: State Route 948 Bloody Run Unroaded Area (assigned a value of 5 in the Forest-wide Roads Analysis Report (2003, page 108) for scenic variety [distinctive landscapes/high variety])
Moderate Scenic Integrity	Appears slightly altered: The valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape being.	Concern Level 2: Forest roads 143 and 237 (southern half) Red Mill Dispersed Site
Low Scenic Integrity	Appears altered: Deviations from the valued landscape character may begin to dominate the landscape being viewed, but they should borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes, or architectural styles that may occur elsewhere.	Concern Level 2: Forest Roads 237 (northern half) and 339

Environmental Consequences

Indicator Measure 10: Effects to the recreation opportunity spectrum, landscape character and scenic integrity levels, and recreation activities and use patterns

Proposed Action

Direct Effects

All proposed activities would have some direct and or indirect effect on the recreation opportunity spectrum, recreation activities and their use patterns, landscape character and the scenic integrity levels of the project area, especially if activities are located near sensitive forest visitor travel corridors (concern level 1 or 2 view facilities). As a result, Forest Plan standards and guidelines (pages 59–62) are applied prior to or during implementation so that no drastic change would occur to the recreation opportunity spectrum, recreation activities and use patterns, landscape character, and the scenic integrity levels within the project area.

Access. This project would add 2.2 miles of new road to the Forest Service road system and realign 0.9 miles of road, opening up new corridors into the project area. These new roads would be maintained in a closed or restricted condition after treatment, so it is expected that there will be no measureable impact on recreation. When timber harvest and associated reforestation activities are complete, the roads would be gated closed but hunters would be able to walk the road into the area for easier access. Proposed timber harvests would open the forest canopy and allow for the growth of new seedlings, as well as blackberry and other shrubs and forbs, increasing browse material for wildlife, which has the potential for increasing hunting success.

Blocking access to utility corridors from illegal ATV use would decrease soil compaction, loss of vegetation, and erosion on these corridors. Since the corridors travel in straight lines across the landscape without regard to topography, this is important in the steep segments where erosion could lead to exposure and compromise of underground pipes and sedimentation into streams at the bottom of the slope. These corridors often lead to user-created trails through the forest. Blocking them would prevent the compaction and loss of vegetation that effectively take land out of production for timber and wildlife habitat, and may decrease interruptions to breeding and brood-rearing of wildlife and birds.

Remoteness. The increased noise and traffic from harvest activities throughout the entire project area would not be out of the norm for roaded natural areas as frequent “sights and sounds of man” are the norm. Project design features would be specified to control times of the year when activities could occur so noise effects to publics are low during prime seasons of use. There are two unroaded areas in the project area. These areas were vetted during the planning process to verify the status of some roads nearby, changes that have occurred since the initial identification of the unroaded areas, and the affect that the project proposals (road construction, realignment, and decommissioning) would have on these unroaded areas. Under the proposed action, the Rocky Run unroaded areas would remain essentially unchanged at 1005 acres while the Bloody Run area would increase to 1505 acres (see Maps 1 and 5).

Site Management. Site management values (development level), would not change because there are no plans to change the existing development level of recreation activities in the project area. Dispersed recreation sites would remain primitive, with improvements such as boulder barriers and parking pads placed for protection of the resource rather than user convenience. Some resource modifications would take place during harvest and reforestation activities (vegetation feathering and seasonal timing of activities) to protect the existing recreation resources of the area. An effort to harmonize modifications with the environment would be made through these design features and mitigation measures.

The closing of some sites would result in campers moving to a different site to find the same kind of recreation experience. The impact of this is expected to be relatively small because it is rare when all the sites in this area are occupied at the same time. Some crowding would be alleviated where closed sites are in close proximity to sites that remain open. Improvements to open sites would enhance the attractiveness and/or functionality of the site and protect the viability of nearby streams.

Visitor Management. Visitor management techniques in the proposed action include the installation of control structures such as gates on roads and fenced harvest units. This would have no effect on the roaded natural recreational opportunity spectrum classes because the standards for those classes include noticeable regimentation and controls that harmonize with the natural environment.

Social Encounters. Social encounters may temporarily increase in some locations or decrease in others due to proposed activities (timber harvest, reforestation, wildlife habitat enhancements, road work, road use, and road decommissioning), because some public displacement may occur. The effect of timber harvest or reforestation activities may be that some forest users (hunters, hikers, dispersed campers) would move into other areas of the forest. Other users, such as people driving for pleasure, would encounter more traffic and larger-sized vehicles on the roads used for timber hauling. No change to the values of the recreational opportunity spectrum setting indicators is expected for the roaded natural opportunity spectrum classes within the project area.

Visitor Impacts. Generally, for scenery analysis purposes, vegetation treatments fall into three broad categories: (1) final harvest treatments, (2) partial harvest treatments, and (3) reforestation treatments. Final harvest and reforestation treatments would have the greatest short-term direct visual effect to the

landscape character and scenic integrity level of the area. With the forest canopy open, the area no longer has mature landscape character and vegetation management is apparent. The open canopy condition allows sunlight to reach the ground and stimulate new seedling growth, which allows the area to become green very quickly. Soil disturbance during and immediately after regeneration harvesting operations also has a short-term effect on the landscape character. Although most areas will revegetate on their own, heavily impacted areas such as log landings and skid trails may need to be seeded. Within one growing season, these heavily impacted areas become green and blend into the natural landscape, softening the visual contrast of the harvest. When new vegetation is established, the altered site has a natural appearance that is within Forest Plan (pages 6264) design criteria of a visually acceptable landscape character.

Intermediate (partial) harvest treatments such as shelterwood seed cut and commercial thinning do not have as great a visual effect as regeneration treatments because they only remove a portion of mature trees and maintain the appearance of an intact landscape character. Based on past experience, most of the activities associated with intermediate harvesting methods meet the scenic integrity level goals of moderate, and exceed the scenic integrity level for low allowed by the Forest Plan in Management areas 2.2 and 3.0.

Reforestation treatments (site preparation, herbicide, release, prescribed fire, scarify) kill competing understory and mid-story vegetation that hinder seedling development either through chemical or mechanical means. The short-term visual effects include an increase in the amount of dead vegetation and brown leaves on the ground. Within 1 to 3 years, the new growth of seedlings and other herbaceous cover would diminish the short-term visual effects of these treatments, creating a more natural-appearing landscape character with a more favorable scenic integrity level.

Other reforestation and wildlife habitat enhancement treatments, such as planting and fencing can improve the ability of a stand to more rapidly reach maturity and have a positive long term indirect effect on the landscape character and scenic integrity level. Planting in an opening provides more vegetative variety and screening. Fencing stands protects young seedlings from deer browse, allowing rapid growth helping the stand to return to a more natural appearing condition.

Vegetation harvesting and reforestation treatments may be evident to forest visitors traveling on high-use corridors, however many of these would blend with the mixture of public and private lands along State Route 948 where openings from residences, business developments, or previous timber harvests already exist. Design features such as “feathering” vegetation treatment areas to create gradual transition zones between affected and unaffected areas, and installing fences away from roads make harvesting and reforestation activities less obvious.

New temporary openings would be combined with existing openings and currently planned openings, creating thirteen blocks where total openings exceed 40 acres. These blocks vary in overall size, but since the treatments take place over the 20 year implementation period, the impact would be dispersed through time and be seen as a gradual increase of openings which would grow up and close as new temporary openings are made. This would provide successive age classes and a transitioning forest scene. Recreational activities such as hunting and trapping would move throughout the area depending on the needs of the species hunted or trapped.

Aquatic habitat treatments would temporarily disrupt the use of treated streams in the area until work is completed. Recreational fishing opportunities would improve and increase as natural stream structure and function is restored. Campsites located along FR 143 may be occupied more frequently, such as mid-week, or by larger groups.

Cumulative Effects

The proposed action would not contribute to any cumulative effects to the recreational opportunity spectrum, concern levels, or scenic integrity levels of the project area because the age class distribution of forested stands within the project area would vary little between the no-action and implementation of the proposed action, except for the amount of early-structural habitat which will decrease within the next 20 years without additional management activities that change structural classes. The proportion of non-forest habitat may increase across all structural classes, depending on the pace of private oil and gas development. The actual effect is difficult to estimate because specific timing and location of future development cannot be predicted. Table 17 projects the change in proportion of structural classes within the project area over the 20 year cumulative effects analysis period. Recreation activities and their use patterns may be affected outside the project boundary on the western side of the project area due to the use of forest road 237, which extends outside the project boundary, as a timber haul route to state highway 948.

Table 17—Projected structural classes of vegetation in the project area

Structural Condition ¹	Year					
	2019		2039			
	Existing Condition		No Action		Proposed Action	
	Acres	Percent	Acres	Percent	Acres	Percent
Forest						
Early Structural	195	2	180 ²	2	1,629 ²	14
Mid-structural	9,387	78	4,679	39	4,363	36
Late Structural	1,705	14	6,428	53	5,295	44
Total Forest	11,287	94	11,287	94	11,287	94
Non-Forest³	765	6	765	6	765	6

1. Structural classes are described in the Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, page 6-24)

2. Includes vegetation management activities from previous NEPA decisions that have not been implemented.

3. Non-forested land may increase by 10 acres across all age classes as a result of future private oil and gas development.

It is unlikely that any of the stands for which management activities have been proposed would change the overall landscape character of the project area. Due to the history of vegetation management within the project area (both public and private lands), the activities in the proposed action are consistent with past management and compatible with the current scenic integrity levels of the area. Proposed activities are consistent with past vegetation management and compatible with the recreational opportunity spectrum and current recreation activities and their use patterns. Cumulatively, the effects resulting from past, proposed, and reasonably foreseeable future management activities would not exceed the established scenic integrity levels of the project areas.

Table 17 also indicates that the amount of timber in each age class varies little between the present condition and the action alternative. This demonstrates that the amount of overstory removal proposed would be consistent with what has occurred in the past. Visually sensitive stands (concern level 1 and 2) have been identified, and Forest Plan design standards and guidelines and project design features will be followed for these stands. Even without application of Forest Plan standards and guidelines, it is unlikely that any of the stands for which management activities have been proposed would change the overall landscape character of the project area.

Due to the history of vegetation management within the project area (both public and private lands), the activities proposed in the action alternative are consistent with past management and compatible with

the current scenic integrity levels of the area. Cumulatively, the effects resulting from past, proposed, and reasonably foreseeable future management activities would not exceed the established scenic integrity levels of the project areas.

Oil and Gas Development Activities. There are currently 60 existing (active or dormant) wells within the project area. Projected oil and gas development for shallow wells between 2019 and 2039 are zero wells. One Marcellus shale well pad is projected, and effects could total as much as 10 acres of forest converted to non-forest. This acreage (10 acres) is less than 0.1 percent of the total project area.

However, oil and gas development can change at any time and is based on economics, technology, and supply and demand. The effects of expanding oil and gas development on recreational opportunity spectrum and recreation activities and their use patterns would include a loss of solitude (due to machinery noise and vehicle traffic), a more modified environment (due to additional roads and well pads), and a reduction in visual quality. These effects do accumulate over time and may result in further concentrating recreation use on areas of public land that have not been developed for oil and gas. Field observations show that intensively developed oil and gas fields do not receive the same density of recreation use as do undeveloped areas in the same management area.

In summary, cumulative effects of this and other projects would be manageable and limited with implementation of effective mitigation strategies. By 2039, 14 percent of the project area would be early structural habitat under the proposed action, as opposed to 1.5 percent under the no action alternative. Projected forest cover loss from oil and gas development by 2039 is expected to be 10 acres or less than 0.1 percent of the project area.

No Action

No direct effects to the recreation opportunity spectrum, recreation activities or their use patterns, landscape character, and/or the scenic integrity level would occur. Any changes to vegetation would be the result of natural stand development or disturbance processes.

Without treatment, many stands would develop dense interfering vegetation that would create less than ideal conditions for hunting and dispersed camping. This may result in a negative effect to recreation activities and use patterns. Areas with damaged trees, debris, or downed trees would continue to hinder hunting and camping activities. Large wildlife species, (deer, bear, and turkey), would shy away from the mature forests due to the low food source (no young seedlings) in the area, which would make mature stands less viable hunting areas. Non-native invasive plant species, if left unchecked, would also discourage hunters, and may cause campers to look for dispersed campsites where more desirable vegetation is present.

In the long term, landscape character and the scenic integrity level of the project area would also change without vegetation, wildlife habitat enhancement, and non-native invasive species management activities. Indirect negative effects to the landscape character and scenic integrity level of the area would include:

- High density stands that would not maintain visual depth or age class diversity, which are characteristic of great scenic value;
- Interfering vegetation that would suppress seedling and shrub development in the understory;
- Declining vigor and health that could result in pockets of dead and dying trees;
- Declining trees that would remain susceptible to disease or pests, so that the stand as a whole would not retain a healthy condition;
- Non-native invasive species that occupy available growing space and use nutrients that

could be used by more desired native species.

Human Health and Safety

Analysis Framework

Potential effects to public health and safety from the proposed action include the use of herbicides and smoke emissions from prescribed fires. Herbicides such as glyphosate or sulfometuron-methyl are used to control interfering plants on the Allegheny National Forest. Human risks are discussed in the Forest Plan Final Environmental Impact Statement and Appendix G (USDA-FS 2007b). Herbicide application would not occur within 150 feet of any private residence. Herbicides would be applied following Forest Plan standards and guidelines (pages 54–59) to minimize the risk of accidental exposure. This would include warning signs, maximum wind caps (10 mph), directional spraying near property lines and trails, landowner notification, timing, and buffers to minimize accidental contact or exposure. Further information regarding risks to human health from herbicide use for seedling establishment and its safety may be found in the Forest Plan (USDA-FS 2007a, pages 54–59; pages A-33–A-38), Forest Plan Final Environmental Impact Statement (USDA-FS 2007b, pages 3-119–3-122), and Appendix G of the Forest Plan Final Environmental Impact Statement. Specific risks to human health associated with use of glyphosate have also been assessed more recently in the Glyphosate – Human Health and Ecological Risk Assessment (SERA 2011), a report prepared for the Forest Service by Syracuse Environmental Research Associates, Inc.

Table 18–Summary of acres proposed for herbicide use

Treatment Type	Maximum Available Area	Maximum Treatment Area
Regeneration timber harvest ¹	1,585	1,585
Non-native invasive plant species treatments ¹	67 ²	67 ²
Total acres	1,652	1,652

¹ May require multiple applications to treat interfering vegetation or non-native invasive plant infestations.

² Does not include any acres treated under the Marienville Buckthorn Treatment decision.

Prescribed fires can pose a hazard to forest users and those driving through the project area. Smoke emissions from proposed prescribed burning would be of short duration. Smoke management through dispersion would be addressed in the burning parameters of the burn plan. Emissions from prescribed burning would not exceed federal air quality standards. The Forest Service would develop safeguards in burn plans to ensure the protection of human life, any surrounding private lands or structures, any fire-sensitive forest communities, and local resources present on these sites. Further information regarding prescribed fires can be found in the Forest Plan (USDA-FS 2007a, pages 81 and 95).

Oil and gas development activities within the project area could include drilling, plugging, hydraulic fracturing (fracking), well construction, access road use, electric lines, pipelines that are either buried or above ground, pump jacks, collection tanks, and other miscellaneous equipment. People working at or traveling around oil and gas development sites and the associated equipment may be exposed to related hazards.

Environmental Consequences

IM-11: Risks to public health or safety

Proposed Action

Overall risks from the planned use of glyphosate and sulfometuron-methyl are expected to be low (USDA-FS 2007a, page ROD-23). Forest Plan standards and guidelines for herbicide application would be followed (USDA-FS 2007a, pages 54–59) and are based on the human health risk assessment (USDA-FS 2007b, Appendix G) completed for the Forest Plan Final Environmental Impact Statement (USDA-FS 2007b). A more recent human health and ecological risk assessment published in 2011 by Syracuse Environmental Research Associates (SERA 2011) examined potential hazards from use of glyphosate and concluded:

- The preponderance of the available data clearly indicates that the mammalian toxicity of glyphosate is low, and very few specific hazards can be identified.
- Many glyphosate formulations include surfactants, and the toxicity of these surfactants is of equal or greater concern to the risk assessment than is the toxicity of technical grade glyphosate.
- There are obvious, and in many cases substantial, differences among the toxicities of technical grade glyphosate, glyphosate formulations that do not contain a surfactant, and some glyphosate formulations that contain polyoxyethyleneamine surfactants.
- In general, it would be prudent to classify any formulation that contains a polyoxyethyleneamine surfactant as more toxic, except when there is a compelling reason to do otherwise.
- For members of the general public, the only non-accidental exposure scenario of concern is for acute exposure involving the consumption of contaminated vegetation shortly after glyphosate is applied.

The surfactant polyoxyethyleneamine is not used in any of the herbicide formulations proposed for use by the Forest Service on National Forest System lands within the Allegheny National Forest in the proposed action or any other management activities. Appendix A of the Forest Plan (USDA-FS 2007a, pages A-43–A-45) also contains additional information on site selection, herbicide selection, and application methods and rates. Any herbicide used in this project would be registered by the Environmental Protection Agency in full accordance with the Federal Insecticide, Rodenticide Act, as amended. Herbicide use would follow all Environmental Protection Agency and Commonwealth of Pennsylvania pesticide application regulations and Forest Service handbook and manual direction. Maximum application rates stated in Tables 17 and 18 on page 56 of the Forest Plan would not be exceeded in any year. Based on monitoring results from previous projects with similar activities, herbicide treatments are anticipated to have negligible effects to public health or safety (USDA-FS 2008, pages 28–33).

Smoke emissions from proposed prescribed burning would be of short duration. Smoke management through dispersion would be addressed in the burning parameters of the burn plan. Emissions from prescribed burning would not exceed federal air quality standards. The Forest Service would develop safeguards in burn plans to ensure the protection of human life, any surrounding private lands or structures, any fire-sensitive forest communities, and local resources present on these sites.

The proposed action would avoid adverse impacts to public health and safety through implementation of Forest Plan standards and guidelines, Pennsylvania best management practices, project design features, timber sale contract requirements, Office of Safety and Health Administration requirements, and standard operating safety procedures (including oil and gas development operations). Maximum application rates stated in Tables 17 and 18 on page 56 of the Forest Plan would not be exceeded in any year on any acre within the project area. Actions, such as dust abatement, signing of roads, identifying the area as an active timber sale area, safely securing truck loads, and maintaining the timber haul routes, are standard precautionary measures that would be applied.

No Action

Risks to public health and safety would occur from previously approved reforestation activities and non-native invasive plant species treatments. Herbicide may be applied as part of previously approved reforestation activities on 4 acres and for treatment of glossy buckthorn and other non-native invasive plant species in the project area. These risks were analyzed in previous associated project findings of no significant impact and maximum application rates stated in Tables 17 and 18 on page 56 of the Forest Plan would not be exceeded in any year on any acre within the project area.

The approved activities would avoid adverse impacts to public health and safety through implementation of Forest Plan standards and guidelines, Pennsylvania best management practices, project design features, timber sale contract requirements, Office of Safety and Health Administration requirements, and standard operating safety procedures (including oil and gas development operations). Actions, such as dust abatement, signing of roads, identifying the area as an active timber sale area, safely securing truck loads, and maintaining the timber haul routes, are standard precautionary measures that would be applied.

Agencies or Persons Consulted

The Forest Service consulted the following individuals, Federal, State, tribal, and local agencies during the development of this environmental assessment:

Federal, State, and Local Agencies

U.S. Fish and Wildlife Service
 Pennsylvania Department of Environmental Protection
 Pennsylvania Game Commission
 Pennsylvania State Historic Preservation Office

Tribes

The Forest Service consulted with the 15 federally recognized Tribes that have historic ties to the area.

Absentee Shawnee Tribe of Oklahoma
 Eastern Shawnee Tribe of Oklahoma
 Shawnee Tribe
 Cayuga Nation
 Delaware Tribe Historic Preservation Representatives
 Delaware Nation
 Oneida Indian Nation
 Oneida Nation of Wisconsin
 Onondaga Nation
 Seneca Nation of Indians
 Seneca-Cayuga Nation
 St. Regis Mohawk Tribe
 Stockbridge-Munsee Mohican Tribal Historic Preservation
 Tonawanda Seneca Nation
 Tuscarora Nation

Others

Elk County Commissioners
 Highland Township
 Ridgway Borough
 Spring Creek Township

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